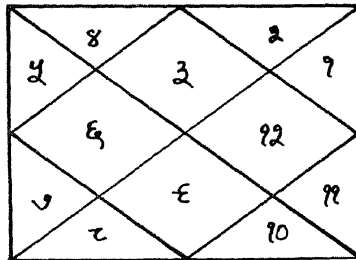


PANCHANG AND HOROSCOPE

OR

The Indian Calendar and Indian Astrology
ASTRONOMICALLY CONSIDERED IN THE LIGHT OF
FIRST PRINCIPLES WITH NUMEROUS PRACTICAL EXAMPLES

DIWAN BAHADUR
L.D. SWAMIKANNU PILLAI



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P R E F A C E .

FOURTEEN years have elapsed since the author published the first edition of his work on *Indian Chronology*. A second edition, in seven volumes, under the title of an "*Indian Ephemeris, A.D. 700 to A.D. 2000*" appeared in 1922. The present compendium, which is practically a third edition, is the result of a suggestion made to the author, in the course of certain lectures delivered by him in 1924 at the University of Mysore on the "Application of astronomical principles to Indian historical investigation." The necessity for an epitome of the kind had been borne in on him ever since the publication of the first edition in 1911; but the subject was at that time so novel and so interesting and opened up so many avenues of further research that constant expansion of the matter on hand had to be provided for rather than how best to condense it; and the author was thankful to the Madras Government for publishing at their own expense in 1922 the revised *Indian Ephemeris* in its full compass of seven volumes. That the author was not alone in his optimism as regards the scope of further work presented in this field of research is proved by the comprehensive volume recently issued by Mr. Robert Sewell (of the Madras Civil Service, Retired) as a continuation of his *Indian Chronography* (1912) as well as by the first instalments of a projected work on the Indian Calendar more recently given to the world by Dr. Van Wijk of Rotterdam, a pure mathematician of high order who has brought acute powers of analysis and stupendous industry to bear on the investigation of the Indian Calendar. The earlier works of Professor Jacobi (of Bonn) and the late Professor Kielhorn still hold the field as masterpieces in the respective subjects handled by them.

2. Any student desirous of consulting these advanced works will experience the need for a book of first steps which, without taxing over much either his industry or his patience, will give him an accurate grasp of the first principles of the science and will at the same time fit him out for useful work in the field of research. The present compendium is designed to provide the necessary first step in theory as well as in practice; and as there has been a considerable demand for a work of this kind both from the English-knowing public and from the far more numerous class of readers who have studied the subject already at its fountain head in Sanskrit or in the vernaculars of India, it is the author's intention to publish this manual in the principal Indian vernaculars as well as in English.*

3. The objective of such readers would naturally be, not epigraphy or chronology—for which the author has hitherto mainly laboured—but to assess at their scientific and practical value the contents of the Indian sciences of Astronomy and astrology. Much original material designed to help the student in forming an independent critical judgment has been culled from various sources for this manual which has in consequence attained the present bulk despite the very modest dimensions originally aimed at. Thus about 12 pages of tabulated lists of Hindu fasts, feasts and festivals are given in Ch. III in order to impress upon the reader the extent to which tithis and nakshatras dominate the Hindu religious calendar and also to afford precise information regarding these matters. Less apology is needed for pages 62 to 87 giving the geocentric places of planets for every ten days in the year for a period of 60 years back and 75 forward from the present date.

4. Although the present publication is for the most part an abridgment of the larger work, yet it possesses certain independent merits of its own. The treatment of planets by means of eye-tables (pp. 55—59) has been rendered uniform, instead of being, as in the *Ephemeris* Vol. I, different for superior and for inferior planets. It is perhaps as well to remind the reader that, thanks to the eye-tables, the actual place of a planet now depends on only two elements each of which has necessarily to be ascertained in every investigation, viz., the day of the solar year (involving, where the moon is concerned, the tithi as well as the nakshatra) and the mean longitude of the planet; instead of, as before, on the successful accomplishment of twelve successive processes (explained at pp. 95 and 97 of the larger work), or, in the alternative, on the employment of the Perpetual Planetary Almanac, a costly apparatus covering 80 pages of folio print (*Ephemeris*, Volume I, pp. 359—437). Thanks to the planetary eye-tables, also, it has become possible to present within the compass of a few pages (pp. 95—108) of the present manual the complete solution of a variety of new and interesting problems on planets in Indian astronomy and Indian astrology. Some thousands of horoscopes which are either textually cited or clearly implied in Varāhamihira's *Bṛhatjātaka* are analysed in these pages, and each of these horoscopes is shown to be resolvable into a particular date either in the remote or proximate past or in the remote or proximate future. The armoury of the critics of astrology, whether friendly or hostile, will in future be very much enlarged by these problems, because it will now be open to the friends of astrology to show that the events predicted by it did happen on the dates respectively portended by the horoscopes and for its adversaries to argue on the other hand, firstly that if the astrologer of the 6th cent. A.D. knew that so many thousands, not to say millions, of his horoscopes were dates pure and simple, he would not have left it to a 20th century writer to point out the fact and in the second place, that if he was not aware of the underlying dates in so many cases, then this would redound neither to his own credit nor to that of astrology. The author would prefer not to enter the arena himself in a work which professes to do no more than expound the astronomical bases of the Indian panchang and the Indian horoscope.

5. Another important feature of the present compendium is the fuller treatment given to the lagna, a conception which seldom affects materially the determinations of chronological research, but which is of vastly greater concern to the student of astrology. The elements required for the determinations, of local sunrise, local time, and lagna in Table T.I. (pp. 40—46) are given for six principal latitudes in India at intervals of 5 degrees, viz., (1) Trivandrum, 8° N.L.; (2) Madras

* Tamil, Telugu, Malayalam and Canarese versions of this book are in an advanced state of preparation. The author will be glad to arrange with publishing firms in other parts of India the terms on which he would be prepared to permit translation into other vernaculars.

13° N.L.; (3) Satara, 18° N.L.; (4) Indore, 23° N.L.; (5) Mathura or Muttra, 28° N.L.; and (6) Jhelum, 33° N.L. For any intermediate latitude, say 10°, 15°, 20°, 25°, or 30°, an arithmetical interpolation can be made in the usual way between the latitudes exemplified in the book. Thus for the 25th day of the Indian solar year, the equation of time at 8° N.L. being -378", and at 13° N.L. -364" and the tropical longitude at 8° being +767" and at 13° +976", the equation of time at 10° N.L. will be $-378 + \frac{5}{5} (378 - 364)$ or -372" and the tropical longitude at 10° will be $767 + \frac{5}{5} (976 - 767)$ or 851".

6. This feature of the Lagna Table T.L. (pp. 40—46) which makes it of practical use and applicability throughout India is mentioned here lest persons resident in latitudes other than that of Madras and its immediate neighbourhood should imagine that they cannot benefit by the instructions at pp. 94, 95.

7. The several Tables in Parts III and IV of this compendium are numbered serially from 1 to 6 and 1 to 19 respectively (*vide* Table of Contents, p. iv *post*), but they are invariably cited in the course of the work by their lettered headings which have been devised on mnemonical principles, so as to assist the memory.

Thus Part III—Table 4, B.R. means the BaRhaspatiya cycle of 60 years.

"	"	"	5, T.L.	"	Table for ascertaining Tropical Longitude or "Time and Lagna."
"	IV	"	1, P.A.	"	Planetary Axis, the Sun's longitude being the <i>axis</i> upon which the whole of the planetary wheel turns.
"	"	"	2 to 8, P.B.	mean	"Planetary Bases" or the base of all calculations relative to planets.
"	"	"	9, P.C.	means	"Planetary Cycles" which is self-explanatory.
"	"	"	10, P.D.	"	"Planetary Decursus" " "
"	"	"	11 to 15, P.E.	"	"Planetary Eye-table" " "
"	"	"	16, P.F.	"	"Planetary Fixation" or "Fixture", <i>i.e.</i> , a table for fixing up or locating planets in a horoscope on their proper date.
"	"	"	17, P.G.	"	"Planets' Geocentric places" which is self-evident.
"	"	"	18, 19 H	"	"Hours" (and the allied ghaṭikas) which is self-evident.
"	V	"	O.D., O'D', p. 98	"	"One date" or "own date," an important set of tables to be used in order to ascertain in the case of any horoscope its Own Date or its One Date.

8. Considerations of space have compelled the author to omit a good deal of astronomical matter which, even in a compendium of this kind, might have been interesting to many readers; while other matter which is here dealt with in a page or two could easily have been expanded into several dozens of pages. This last remark is specially applicable to the five eye-tables on the several planets, actually comprised in not more than the same number of pages (pp. 55 to 59). Each planetary eye-table is arranged for every ten completed days of the Indian Solar year and for every ten degrees of the planet's mean longitude. This necessitates a certain amount of interpolation in the course of actual work, and the author would advise readers who have frequent occasion to convert mean longitudes of planets into actual geocentric places to construct detailed tables for themselves, interpolating into each table all the 365 days and all the 360 degrees or at least, to begin with, the 360 degrees. Such a table would take up a hundred pages of print for every planet, and it would have been out of the question to insert it in the present compendium; in fact, room could not be found for it even in the larger work. The author will, however, be glad to furnish any readers who are interested in the subject with models for the preparation of such a table.

9. Compression has again been resorted to in the case of Table P.F. which, in the present edition, occupies only two pages (instead of 20 in the larger work), although occasion has been taken to deal with Mercury, Venus, and Rāhu as well as with the major planets, Mars, Jupiter and Saturn. The table gives information only for 500 years and all the illustrative problems in Part V are worked out on the basis of a 500 years' table; but of course a full table for 1,768 years, which the author will be glad to supply on application along with the extended eye-tables referred to in para 8 *supra* would tend to greater expedition. And generally speaking, however carefully a manual like the present one may have been designed, every student who is really interested in the subject will have to devise a good deal of special apparatus for himself to suit his special needs.

10. Lastly for reasons other than those of economy, it has been found necessary to omit a good deal of explanatory matter concerning Astrology, which the reader might perhaps expect from the title "Panchang and Horoscope." The author has had to keep before his mind throughout this compilation a hard and fast distinction, however inconvenient it might be to put it in practice, between Astrology and Astronomy, and to leave out all matter which could be picked up by students from ordinary works on Astrology whether in English or in the Vernaculars. For this reason no attempt has been made to expound the arrangement of planetary houses, their meanings and influences, the division of rāsis into navāmsās, dvadāśāmsās, trimśāmsās and shasṭhāmsās, the houses of exaltation and debilitation, of friendship and enmity, and a thousand other matters that popular books on Astrology deal with. What the author really wished to place before the public, and he hopes he has accomplished this with some success in the present compendium, is a careful survey of the borderland between Astrology and Astronomy, which is very seldom dealt with, much less explored, by ordinary writers on astrology.

PANCHANG AND HOROSCOPE

OR

THE INDIAN CALENDAR AND INDIAN ASTROLOGY

ASTRONOMICALLY CONSIDERED IN THE LIGHT OF FIRST PRINCIPLES WITH NUMEROUS PRACTICAL EXAMPLES

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PANCHANG AND HOROSCOPE.

PART I.—THE PANCHANGA.

CHAPTER I.

BRIEF EXPOSITION OF PANCHANGA, SUNRISE AND LAGNA.

1. The Panchang Eye-table, pp. 34 to 38, is a complete guide which will enable any one to compute for himself, *a fortiori* to understand, the five elements of a panchāṅga, (1) Tithi, (2) Vara, (3) Nakshatra, (4) Karana,* (5) Yoga. Some authorities drop the *karana* and regard as the 5th element *ahās* or the duration of daylight. The same table draws attention to certain other features of the Indian Calendar which are no less essential to it than the five elements of the panchāṅga : these are the commencement (1) of the solar year and (2) of each solar month, (3) the number of days comprised in each solar month, the incidence of (4) Adhika and (5) Kshaya months, the equations resulting from (6) the solar and (7) lunar anomalies, and the mutual relation between (8) Nakshatras and (9) Yogas on the one hand and tithis on the other.

The Eye-table is divided into 26 parts, *a* to *z*, lettered serially in the margin of the table (*z*, however, stands first, as explained below, for a mnemonic reason), and the following explanation adheres to this order.

EYE-TABLE, SECTION *z*.—*The signs of the zodiac.*

2. Section *z* which is placed at the head of the Eye-table does not contain any calculated tabular matter, and is styled *z* firstly, to arrest attention, and secondly, because it refers to signs of the *zodiac*.

3. *Order of signs of zodiac or rāśis and longitude of commencement of each sign or rāśi.*—The twelve signs of the zodiac or *rāśis*, were borrowed by the Hindus from a western source, Chaldean or Greek, as is apparent from the fact that Varāhamihira names each sign first in Greek (Kriya, Tauro, Jimuthro, Kankri, etc.), and then in Sanskrit (Mēsha, Rishabha, etc.). The longitudes of the *rāśis* are reckoned in Indian astronomy from a fixed point in the heavens, generally identified as *Zēta Piscium*, whereas in European astronomy, the 0° of longitude is reckoned from the meeting point (which is liable to variation from year to year) of the celestial equator and the ecliptic. In European astronomy this meeting point is conventionally called the first point of Aries, but it is not now in the *constellation* Aries, because every year, owing to the precession of equinoxes, the first point of Aries moves back 50 seconds of an arc along the ecliptic. About A.D. 532 the first point of Aries of European astronomy was identical with the 0° longitude of Indian astronomy, but since then the former has receded every year, till now there is a difference of 23° between the first point of Aries (European astronomy) and the 0° longitude of Indian astronomy, *vide* paragraph 59 below. For his present purposes, the student need not trouble himself with the difference between the two reckonings of celestial longitude, but he will understand that when, for instance, the planet Jupiter is said to be 15° in *Kanyā*, the meaning is that the longitude of Jupiter is, according to Indian astronomy, 150°+15°, or 165°.

EYE-TABLE, SECTION *a*.—*Moment of sankrānti in days of solar year and decimals of a day.*

4. The moment when the sun enters a *rāśi*, *i.e.*, when his longitude is 0°, 30°, 60°, etc., is called a *sankrānti*, or *Sankramāṇa*, p. 14 below, an epoch with which Hindu festivals are often associated. The first *sankrānti* or *Mēsha sankrānti* is the most important of all, being the beginning of the Indian solar year. In the European Civil calendar the year begins at midnight between the 31st December and the 1st January, and each month has a fixed number of days, 31 or 30 or 29 or 28 as the case may be. The Indian solar year may begin at any moment of the day. This moment, to five places of decimals, is given for each century year in section *k* of the Eye-table and it is given for every A.D. year in Table II of the larger work. In the same manner each month may begin at any moment of the day and the duration of a month cannot be expressed as a whole number of days, but can only be stated as so many days and a fraction, which is given in section *a* of the Eye-table. Nor is this all. The actual duration of a month under each *siddhānta* varies, theoretically, according to the epoch : for instance the duration of *Mēsha* month was not the same under the *Sūrya* *siddhānta* in A.D. 500 as it is now. The duration has to be calculated for each epoch as explained in Chapter IV of the larger work. Still the variation, even during a period of 2,000 years, is not very material and we generally apply to the whole period the durations of months calculated for a particular epoch. The durations of months given in the *Sūrya* *siddhānta* Eye-table were calculated by the late Sankara Balakrishna Dikshit for the epoch A.D. 1237 and have been verified by the present writer for A.D. 1165.

Bengal, Orissa and Madras Rules.

5. Though the moment of a *sankrānti* is the same all over India for the same *siddhānta*, yet the commencement of the corresponding month for *civil* purposes is not necessarily the same all over India. The following rules on the subject are adopted from Messrs. Sewell and Dikshit's "Indian Calendar" :—

(1) In Orissa the solar month of the *Amli* and *Vilayati* eras begins on the day of *sankrānti*, at whatever moment of the day the latter may happen. Accordingly in Orissa, the solar months begin on the *sankrānti* days.

(2) In Bengal, when the fraction of the day at which the *sankrānti* happens does not exceed 45 *ghaṭikas* (midnight) the solar month begins on the next day ; and when the *sankrānti* occurs after 45 *ghaṭikas*, the solar month begins on the next day but one. Accordingly the Bengal months corresponding to *Amli* A.D. 1910 (Bengal solar *Ashāḍha*) and to Malayalam

*A *karana* is a half-tithi. The ending moment of every second *karana* coincides with the ending moment of a tithi. For list of *karanas* see the larger work, p. 199, or any panchang. In practice the panchangs only mark that *karana* for a day whose ending moment is 30 *ghaṭikas* or less from sunrise. If the tithi itself ends at 30 *ghaṭikas* or less from sunrise, the same ending moment is entered in the panchang against both tithi and *karana*.

Dhanus A.D. 1910 (Bengal solar *Pausha*) commenced on 15th June and 16th December 1910 respectively and not on 14th June and 15th December 1910 (the days of the *sankrānti*), while Bengal solar *Magha* in A.D. 1910-11 did not commence till 15th January 1911 (*i.e.*, two days after the *sankrānti*).

(3) In Southern India, in the Tamil country, when the fraction of the day at which the *sankrānti* occurs does not exceed 30 *ghaṭikas* (*i.e.*, when the *sankrānti* occurs, roughly, before sunset) the solar month begins on the same day. That is why, for instance, the beginning of Tamil *Ani*, A.D. 1910, coincided with the day of the *sankrānti*, 14th June 1910. When the *sankrānti* occurs after 30 *ghaṭikas*, the solar month begins on the next day. Examples will be found on any page of the In Malabar, when the *sankrānti* occurs after 18 *ghaṭikas*, the solar month commences on the next day.

Eye-table, SECTION a—*continued*. English date corresponding to each *sankrānti*. A.D. 1900.

6. Under this heading the Eye-table gives the correspondence of the *sankrāntis* to the days of English months. Thus it is stated that the *Mēsha sankrānti* in the year 1900 A.D. corresponded to April 12. If the reader runs his eye down column *k* in the Eye-table, he will find that, whereas in A.D. 400 the *Mēsha sankrānti* or commencement of the Indian solar year, fell on March 17, the same *sankrānti* in the year 1700 A.D., even before the application of the Gregorian reform of the calendar began to affect the differences between the Indian and the European calendar, fell on March 28, a difference of 11 days for 1,300 years. This is a result of the Indian calendar being regulated, not by the tropical year, like the European calendar, but by the sidereal year. The exact equivalent in English month and day, of any particular *sankrānti* can be calculated in the least possible time by means of the Eye-table, as shown in paragraph 22 below, but the present intimation in section a of the Eye-table is merely intended to show how in practice the beginnings of Indian solar months run in relation to the beginnings of European calendar months.

Eye-table, SECTION a—*continued*. The name of each lunar month varies according as it commences before one *sankrānti* or another.

7. This line of the Eye-table gives the names of the 12 lunar months, *Chaitra*, *Vaiśākha*, *Jyēṣṭha*, etc. Except in Southern India and in Bengal, the ordinary civil reckoning over the whole of the Indian continent is by lunar months; and even in the excepted provinces, the calculation of days according to the lunar month has to be made much more often than the reckoning according to solar months. To understand the lunar reckoning in all its details is to understand in its entirety the Indian calendar system. Nor very much by way of a detailed explanation of the lunar month can be attempted in this place, but it is necessary to note one or two points that are indispensable to a proper understanding of the subject even at this stage. The first point is, that in the ordinary scheme of 12 solar and 12 lunar months in a year, the name of month is not fixed but varies according as it commences before one *sankrānti* or another.

For instance, the lunar month called *Chaitra* must begin within 29·53 days before the *Mēsha sankrānti*, or the commencement of *Mēsha* solar month; the lunar month *Vaiśākha* must begin within the same interval of 29·53 days before the *Rishabha sankrānti*, or commencement of the *Rishabha* solar month; and passing to a later month, the 7th lunar month *Kārtika* must begin within an interval of 29·53 days before the *Vṛischika sankrānti*, or commencement of the *Vṛischika* solar month. Now the ordinary interval between any solar *sankrānti* and the next is 30 or 31 days as in the European calendar, but the ordinary interval between the commencement of a lunar month and the commencement of the next lunar month is only 29·53 days; so that it must sometimes happen that more lunar months than one have their beginning in the interval between two solar *sankrāntis* or, which is the same thing, between the commencements of two solar months. Following the principle first laid down, in the words italicized above, both the lunar months beginning in this way during the period intervening between two solar *sankrāntis* receive the same name, the first being called *adhika* or intercalary, and the second *nija*, or proper. Intercalary lunar months are found in many calendars other than the Indian, but the Indian calendar has its own method of determining the intercalary or *adhika* lunar months and this method has been rigorously enforced for many centuries. As an *adhika* lunar month is of frequent occurrence, seven such months being due in the course of 19 years, it follows that the solar month, which is ordinarily an item neglected in civil reckoning over the greater part of India, is nevertheless indispensable in order to ascertain whether there will be an *adhika* month in a particular year. And since the intervals between the same solar months are not the same according to the different *siddhāntas*, it also follows that when there is an *adhika* month according to one *siddhānta*, there may not be an *adhika* month under another *siddhānta*. But whenever there is an *adhika* month, the total number of lunar months in a year is thirteen, not twelve.

Following the same principle, when in the course of a single lunar month, there are two solar *sankrāntis* or commencement of solar months which may happen occasionally in the case of the short solar months concurring with *Mārgasīra*, *Pausha*, *Māgha*, then the lunar month which would normally precede the second *sankrānti* and which in this case does not exist is *kṣaya* or suppressed.

Eye-table, SECTION b.—Increase in days (1) of lunar months, and (2) of sun's anomaly.

8. This line of the Eye-table merely gives multiples from 1 to 13 of 29·5306 days for each lunar month. The use of this line will be understood when we come to calculate the sun's anomaly at a particular moment. (Para 25 below.)

Eye-table, SECTION c.—Increase of moon's anomaly from month to month when the interval between *Mēsha sankrānti* and the first new moon in the solar year is 0·00 day.

9. The length of the synodical month, or the interval between one new moon and the next is 29·5306 days, whereas the length of the moon's anomalistic month or the month which determines the irregularities in the moon's motions, is 27·5546 days. The difference between these two periods is 1·976 days and this difference increases from month to month. The moon's anomaly at the commencement of any solar year is obtained by adding the quantities in sections *m* and *p* of the Eye-table. This anomaly is then increased by the interval between the commencement of the solar year and the first new moon in the solar year, for which purpose we add the quantities in sections *l* and *e* in the Eye-table as shown in paragraph 26 below. We have now got to the moon's anomaly at the first new moon in a solar year. If to this quantity

we add one of the quantities in section c of the Eye-table, we get the moon's anomaly at the commencement of the various lunar months in a given year. Section c of the Eye-table is, therefore, an important datum for calculating the lunar anomaly, and we shall duly make use of it for that purpose later on, paragraph 24.

Eye-table, SECTION d.—*Tithi equivalent in days.*

10. In the Indian calendar system the days are reckoned, not from midnight to midnight as in the European calendar, but from sunrise to sunrise; and further, the lunar month of 29 53 days is divided into 30 tithis, so that each tithi is not exactly one day, but .9843 of a day. A tithi may end at any part of a day and in theory, in order to know what is the tithi at any moment of the day, it is necessary also to know what tithi came to an end that day and when it came to an end, and what tithi is running at the moment in question. In practice, however, and for most purposes of civil reckoning, the tithi for a day is fixed by that tithi which was current at sunrise of that day and no account is taken of any other tithi that may commence during the day, except for astrological purposes. But the complications connected with tithis do not end here. The Indian calendar takes account not only of mean periods of time which, properly speaking, should be the sole basis of civil reckoning and which, in all probability, did exclusively govern the Indian calendar in ancient times, but also of the *actual* ending moment of a tithi, a month, a year and so on. This minute concern about actual ending moments is peculiar to the Indian calendar and necessitates constant recourse to a panchānga or Ephemeris in which the ending moments have been previously calculated.

11. The ending moment of a tithi is the moment at which the moon is removed from the sun by an exact multiple of 12 degrees. The moment when the moon's distance from the sun, or elongation, is exactly 12 degrees, is the ending moment of the first tithi; similarly the second tithi ends when the moon is exactly 24 degrees from the sun, and full moon is the moment when the moon is 180 degrees from the sun, i.e., when it is exactly opposite to the sun in the heavens. The determination of the moment when the moon is in each of these several positions is a tedious astronomical process which, in modern astronomy, can be accomplished only by means of a nautical almanac; nautical almanacs are in fact being used extensively by Indian panchāngam-makers of the present day who follow the so-called Drigganita system which, however, is no system at all of Indian astronomy, but is a conventional name for a system based on a European or an American nautical almanac. The exact modern astronomical process for determining a tithi would require the employment of quite a large number of equations, some of them very minute and very complicated in character; but the Indian calendar has for a long time used for the determination of tithis only two equations, viz., one depending on the *moon's anomaly* and the other on the *sun's anomaly*. Both these equations are also used for yogas, and one of them, the moon's equation, is used for nakshatras. Similar equations, called the annual parallax and the anomalistic equation, are used to determine the exact position of planets in Indian astronomy.

Eye-table, SECTIONS e, f, g.—*Moon's anomaly and equation of the centre in days and decimals of a day.*

12. In these portions of the Eye-table we are confronted directly with the equations of the moon last mentioned. These equations are given to two decimal places from .00 to .41 in the case of tithis; from .00 to .38 in the case of nakshatras; and from .00 to .35 in the case of yogas. If these equations were carried to four places of decimals, as they must be when we wish to ascertain the ending moments of tithis, nakshatras and yogas in palas as well as ghaṭikas, we would need much more extended tables, which are given in the larger work. For practical purposes, even of accurate calculation, in Indian epigraphy and in Indian history, we do not need to use more than two places of decimals of a day, and that is why the Ephemeris gives the ending moments of tithis and nakshatras to two decimal places.

13. In order to know what equation to apply towards the determination of the ending moment of a particular tithi, nakshatra, or yoga, we must know the anomaly of the moon at that moment. The anomaly of the moon is first of all given for the commencement of each solar year (*vide* columns m and p of the Eye-table) and to this quantity we add the successive periods of time which will bring us to any given moment in the year for which we wish to know the tithi, nakshatra, or yoga. In other methods for the verification of the Indian calendar, it is usual to express the anomaly of the moon or of the sun as so many degrees from *perigee* or *apogee*. In order to simplify calculation, however, all anomalies are expressed in the present work in days and fractions of a day, 360 degrees being equal to one anomalistic month of 27.5546 days in the case of the moon, and one anomalistic year of 365.26 days in the case of the sun. The reckoning of the anomalies in the present work is always from *perigee*. The anomaly of the moon at any given moment having been ascertained in days, we have to find from sections e, f or g, of the Eye-table the corresponding equation, with its appropriate sign, as directed in the head-line to these sections.

Eye-table, SECTIONS h, i.—*Sun's equation of the centre and sun's anomaly in days of the solar year, for tithis and yogas.*

14. For tithis and yogas we require the sun's equation as well as the moon's and sections h and i of the Eye-table give us these equations. As the sun's equation does not vary, except in the third place of decimals, for a whole day, the anomalies are given generally in whole days of the year, except where the equation is at a minimum or at a maximum, in which case the exact fraction of the day for which the minimum or maximum is appropriate is also indicated. In the extended anomaly and equation tables for which the reader is referred to the larger work, sun's anomalies are given to two places of decimals of a day, and sun's equations to four places of decimals of a day.

15. The 0 day of the sun's anomaly is properly speaking the day and moment of the day in a year when the sun is at *perigee* exactly. Now the sun's anomalistic position on any given day of the year is practically the same, whatever year may be under consideration, and therefore, the sun's equation tables in the present work merely give for each day of the solar year the corresponding equation, viz., the equation of the anomaly corresponding to the day. In the Arya siddhānta this assumption is quite correct; in the Sūrya siddhānta it is very nearly correct; but in the Brahma siddhānta and the Siddhānta Śirōmani, while the table of anomalies and equations is the same, a correction for the number of days of the sun's anomaly has occasionally to be made, as shown in the illustrative examples on the several siddhāntas in the larger work.

16. The week-day is the meeting ground of the Indian and European calendars, and whatever date we may be engaged in investigating, it is generally useful, and almost invariably indispensable, to know what was the week-day of that date. This information has to be found as quickly as possible, but at the same time accurately. The Indian method for ascertaining the week-day is the primitive one of dividing by 7 the ahargana or number of days which have elapsed since 0 Kaliyuga. Many good methods have been designed and published in modern times for ascertaining week-days, and Eye-table j has been selected as being the best of them. It consists in the addition of four figures, viz., (1) a constant for the century, (2) a constant for the odd years in a century, (3) a constant for the month, and (4) the day of the month. The example given in section j of the Eye-table, viz., "Find the week-day of 26th January 1844" will illustrate the ordinary use of this perpetual almanac for A.D. years. For a B.C. year e.g., the 15th of March 44 B.C., since B.C. years are reckoned backwards, we must first of all turn the B.C. year into the forward year of a particular century. In this case 44 B.C. is the 57th year of the century beginning with 101 B.C. [Centuries B.C. always begin with 101, 201, 301, etc., and not with 100, 200, 300, etc.] Then we proceed to find the constant for the century 101 B.C. which is 0 and add the constant for the year 57. for March, and lastly 15, i.e., $1 + 2 + 15 = 18$. This, divided by 7, leaves as remainder 4, so that we know that the week-day of 15th March 44 B.C. was a Wednesday.

17. An important warning has, however, to be given in regard to week-days in B.C. years. So far as is at present known, the only people who observed week-days in B.C. years were (1) the Assyrians, Babylonians and Egyptians whose week-days do not, however, figure in any known history, (2) the Chaldeans who practised astrology in the Grecian and Roman states and (3) the Jews who appear at a very early time to have borrowed the week-day reckoning from the Chaldean peoples with whom they were associated. The Romans and Greeks, throughout the period of the classical literature which has come down to us, do not seem to have had any practical knowledge of the week-day, except that they knew that the Sabbath or seventh day of the week was a day of rest among the Jews. One solitary reference to a planetary week-day, and that by the Latin poet Tibullus who was a student of astrology, and a *graffito* or charcoal inscription found in the buried city of Pompeii are all the evidence we possess to prove that the Romans of the first century A.D. were acquainted with week-days.

18. At what epoch the Hindus became acquainted with the week-day is an interesting but obscure point; but since it came to them from a Graeco-Roman source, during Christian times, and subsequent to Ptolemy's date (middle of second century A.D.), as we know from Indian inscriptions and other early references to the week-day in Indian literature, and also from the very few week-days which have come to light in Indian inscriptions and records between the fifth and eighth centuries A.D., we may presume that the week-day was not in common use in India before the eighth century A.D. and not at all in use before the fifth century A.D. In the rather keen controversy on this subject, which is one of constant recurrence in Indian journals and newspapers, it is of importance to bear in mind that, while the original planetary week-day was an instrument of Chaldean astrology and as such presumably known to Greek and Roman students of astrology in the century preceding the Christian era, the subsequent practical use of the week-day for civil reckoning was probably due to the exigencies of early Christian usage, which found in it a convenient means of naming several important days in the Christian liturgical year, such as Holy Thursday, Good Friday, Holy Saturday and Easter Sunday. The earliest references to the week-day, as an item of civil reckoning, are, in fact, to be found in a well-known passage of the Christian Apologist and Martyr, St. Justin, in the first quarter of the second century A.D. We next find the week-day mentioned, as an institution currently familiar, but of recent origin, by Dio Cassius, a Greek historian of the early Roman Empire, about A.D. 225. Dio Cassius also gives an explanation of the order of week-days, which is identical with the explanation given by the Indian astronomer Varāhamihira. By the time of Constantine the Great (beginning of the fourth century A.D.) we find the week-day in common use in the Roman Empire for describing Christian feasts and festivals. This was precisely the epoch at which Greek ideas of astronomy, mathematics and medicine flowed freely into India, and the epoch probably at which the week-day began for the first time to make its appearance in India.

19. Between the time, however, of the first appearance of an idea like that of the week-day in any country and its coming into general use, there was bound to be a fairly long interval of possibly two or three centuries; and we may note that so late as the tenth and eleventh centuries A.D., inscriptions in Ceylon are still wanting in week-days. The practical conclusion to be drawn from these various data is that it is vain to look for an allusion to a week-day in any literature, Eastern or Western, in any century B.C. and that any alleged find of such an allusion must be examined very critically. It is characteristic that the very first reference in any history, sacred or profane, in which the week-day has played a part in chronological investigation, is in connexion with the exact date of the Last Supper and the Crucifixion of Christ. By means of the week-days, occurring in the Gospel narratives of the New Testament, we know that these events must have happened in one of three years, A.D. 29, A.D. 30, or A.D. 33, although it will always remain a disputed point in which of the three years these events happened. *Encycl. Brit.*, 11th edition. Art., "*Bible Chronology, New Testament.*"

20. A *Nota Bene* in section j of the Eye-table draws attention to the dates when the Old Style of reckoning ceased in the different parts of Europe, as well as to the date, 14th September 1752, when the New Style was adopted by Act of Parliament in the United Kingdom.

EYE-TABLE, SECTIONS OR COLUMNS k, l, m, n, o, p.

21. These sections of the Eye-table furnish three items of information which must form the first step in any Indian chronological reckoning according to the author's method. For any such reckoning we want to know (1) the exact moment when a solar year commenced, for which purpose we consult column k, adding to a figure in that section a quantity in column n when necessary; (2) the exact moment of the first new moon in the particular solar year with which we are concerned; this is given in column l of the Eye-table, to which we add, when necessary, a quantity in column o, deducting again, when

necessary, once or twice 29·5306 days; (3) the moon's anomaly at the commencement of the solar year, as given in column **m**, to which a quantity from column **p** should be added for odd years in a century. In applying columns, **m** and **p**, however, it should be remembered that the moon's anomaly, to be at all useful, must also be reckoned up to the first new moon in the solar year, for which purpose the quantities in columns **l**, **o**, **m** and **p** should be added together. Just as columns **k**, **l** and **m** give certain information for the first year in a century, columns **n**, **o** and **p** give the same information for all the odd years of a century.

A PRACTICAL ILLUSTRATION OF THE EYE-TABLE.

22. This is a convenient stage at which we may introduce a simple example illustrating the most usual processes of reckoning in the Indian calendar. Taking as an example the 12th tithi in the bright fortnight of Lunar Āshāḍha or Āshāḍha sukla dvādaśī, as it is called, in the year A.D. 1924-25, we shall show how the Eye-table without any other apparatus will enable us to calculate the exact English equivalent of the ending moment of the tithi and also to verify the week-day. The reader will save himself a good deal of future trouble by carrying out carefully the processes indicated below. Section **k** of the Eye-table tells us that in A.D. 1900 the solar year commenced on April 12·62. Section **n** further shows that for 24 odd years of the century the fraction to be added for determining the commencement of the solar year is ·21. We know, therefore, that in the year A.D. 1924 the Indian solar year commenced, according to the Sūrya siddhānta, on April 12·62 + ·21 = April 12·83. Similarly, section **l** tells us that in the year A.D. 1900 the first new moon in the solar year was removed from the commencement of the year by 16·71 days; to which we add, from section **o**, the interval of the first new moon in the solar year corresponding to 24 years which is 4·37 days. The two quantities being added, we infer that in A.D. 1924 the interval between the commencement of the solar year and the first new moon in the same solar year was 16·71 + 4·37 = 21·08 days.

23. The same process performed with the aid of sections, **m** and **p**, informs us that in the year 1924 A.D. the moon's anomaly at the commencement of the solar year was 14·35 + 3·85 days. Consequently the moon's anomaly at the first new moon in the same solar year must have been 21·08 + 18·20 + 37·28 days. Subtracting from this one full anomalistic month (Eye-table **d**) 27·55 days, we have, as the age of the moon's anomaly at the first new moon in the solar year A.D. 1924-25, 11·73 days.

24. We have now to carry on these reckonings to the 12th tithi of Āshāḍha month, for which purpose we have to add 59·06 days according to section **b** of the Eye-table for Āshāḍha month, (2) 11·81 days for the ending moment of the 12th tithi according to section **d** of the Eye-table, and (3) 3·952 days (section **c** of the Eye-table) plus 11·81 days for the increase of the moon's anomaly from first new moon in the solar year to the 12th tithi in Āshāḍha month. The English equivalent of the date of the mean tithi we are in search of is given by April 12·83 (the commencement of the Indian solar year A.D. 1924-25—sections **k** and **n**) plus 21·08 days (interval between commencement of solar year and first new moon in solar year—sections **i** and **o**) plus 70·87 days (interval between first new moon in solar year and 12th tithi of bright half of Āshāḍha month—sections **b** and **d**) = April 104·79 which by section **q** of the Eye-table is equal to ·79 day on July 13, A.D. 1924.

25. The sun's anomaly at the ending moment of the mean tithi that we are in search of is given by 21·08 days (interval between the commencement of the solar year and first new moon—columns **l** and **o**) plus 70·87 days (interval between first new moon in solar year and end of 12th tithi of bright half of Āshāḍha month—section **y** or sections **b** and **d**) = 91·96 days. According to the sun's anomaly table **h** (pp. 34, 35), the equation for a sun's anomaly of 92 days is -·04 day.

26. The moon's anomaly at the mean ending moment of the 12th tithi of the bright fortnight of Āshāḍha month is given by 11·73 days (the quantity arrived at in paragraph 23 for the moon's anomaly at the first new moon in the solar year according to columns **l**, **m**, **o** and **p**), plus 15·764 days (the increase of moon's anomaly up to Āshāḍha sukla or bright fortnight, 12th tithi—sections **c** and **d** of Eye-table) = 27·49 days. Before using this moon's anomaly we have to add to it algebraically the sun's equation already arrived at for the day in question, viz., -·04 day, and we obtain, as the net moon's anomaly for the given moment, 27·45 days. With this result we go into the moon's anomaly and equation table **e** and find that the equation for 27·45 days is +·01 day.

27. We now add algebraically the sun's and moon's equations obtained from the anomaly tables, viz., -·04 day +·01 day, to the ending moment of the mean tithi in English time already arrived at, viz., April 104·79. The net result is April 104·79 + ·01 -·04 = April 104·76. We know from section **q** of the Eye-table that April 92 is equal to July 1, so that April 104 is equal to July 13. We know also from section **r** of the Eye-table that ·75 of a day is equal to 45 ghaṭikas and ·01 of a day is equal to 37 palas; so that ·76 of a day is equal to 45 ghaṭikas and 37 palas.

28. According to section **j** of the Eye-table, the week-day of July 13, A.D. 1924, is given by the formula $(2 + 2 + 5 - 13) \div 7$; the remainder in this division being 1, we know that the week-day was the 1st day of the week, or Sunday. We conclude that the ending moment of the 12th tithi of the bright fortnight of lunar Āshāḍha month in the year was Sunday, 13 July A.D. 1924 at 45 gh. 37 palas after mean sunrise. All these processes may be shortened a good deal when the student is familiar with the different portions of the Eye-table, and no process at all is necessary if the Ephemeris for the year in question (in this case Vol. VII A.D. 1800—1999) is at hand, for that will show at a glance the ending moment of any tithi or nakṣatra to two decimal places. But the above example, given in detail, will satisfy the student that it is possible with the aid of the Eye-table only and without any high mathematical processes, to arrive at the absolute ending moment of a tithi, correct to two places of decimals.

EYE-TABLE, SECTION **q**.—Days counted from March 1 and days counted from April 1.

29. The reader who has attentively followed the explanation of sections **k**, **l**, **m**, **n**, **o**, **p**, and the illustrations given thereunder will have seen the practical use of section **q** of the Eye-table. In arriving at the English equivalent of any Indian date, we have to count days from the commencement of the solar year. Running the eye down section **k** of the Eye table,

the reader will notice that, while at the beginning of Kaliyuga the Indian solar year began on the 15th of February, by the time we come to A.D. 400, which is practically the earliest date that can possibly be verified according to the details of the Indian calendar, the Indian solar year then (*i.e.*, in A.D. 400) commenced on 17th March, according to the *Sūrya siddhānta*. The commencement of the Indian solar year is thereafter retarded at the rate of one day for every century until A.D. 1752, when the introduction of the New Style into the British calendar carries forward the English equivalent by 11 days at once; and from A.D. 1753 forwards, down to our time, the Indian solar year has always commenced in April. Now section *q* of the Eye-table enables us to calculate readily the English month and date corresponding to a certain number of days counted from 1st March or 1st April respectively. Example:—Given that an Indian solar year commenced at 36 of the day on the 18th of March and that the ending moment of a particular tithi was 345·5 days from the commencement of the Indian solar year; required to know the English date. Answer:—March 18·36 + 345·50 = March 363·86. By section *q* of the Eye-table, March 338 = February 1; therefore March 363·86 which is 338 + 25·86 = February 1 + 25·86 = February 26·86 of the following English calendar year. In reckoning days from April 1, we have to remember that in a leap year April 336 is equal to March 1 of the following year as shown in section *q* of the Eye-table, whereas in an ordinary year April 335 is equal to March 1 of the following year. This means of course that if there is a leap year in the year following April 1, that is in the next calendar year, then April 336 is equal to March 1 of the following year.

Eye-table, SECTION r.—*Ghaṭikas and palas*.

30. This section gives the ghaṭikas and palas corresponding to the decimal parts of a day. The section is so constructed that any decimal part of a day, down to four decimal places, can be interpreted as an exact number of ghaṭikas and palas so as to give the exact equivalent in Indian time. An example of this might be given by translating ·8530 of a day into ghaṭikas and palas (51 ghaṭikas 11 palas). It should be noted that the division of the day into 24 hours has been known in India only since the introduction of the Greek (Ptolemaic) system of astronomy and astrology, that is, since about the 5th century A.D. and that Indian time is normally expressed sexagesimally, *i.e.*, in ghaṭikas, each ghaṭika being the sixtieth part of a day, and palas, each pala being the sixtieth part of a ghaṭika. The occurrence of an allusion to “hora” either as a lagna or as the 24th part of a day furnishes, as was noted by the late Dr. Burgess in his contribution to the *Journal of the Royal Asiatic Society* (1893), intrinsic evidence that the work must be subsequent to the introduction of the Ptolemaic astronomy into India. A practical application of this observation is furnished by the reference to *hora* in the text of the ancient Tamil Grammar, the *Tolkāppiyam*, *Poruḍadikaram*, *Kaḷaviyal*, verse 135.

மறைந்த வொழுக்கத் தோரையு நாளுந் துறந்தவொழுக்கங் கிழவொர்க்கிலுலை, ||

Translation. “In *Kaḷaviyal*, *i.e.*, the pre-Āryan marriage rule, the man is not obliged to abstain during prescribed days and hours or lagnas (as in the Āryan rule).”

The occurrence of an allusion to *hora* in this text shows that notwithstanding popular belief to the contrary, this part of the *Tolkāppiyam* could not have been composed much before the sixth century A.D.

Table H, the last table in this work, may be referred to when the reader wishes to convert any fraction of day, without loss of time, either into ghaṭikas and palas or into hours, minutes and seconds, and *vice versa*.

Eye-table, SECTIONS s, t, u.—*Nakshatras*.

31. These sections of the Eye-table give all the information that is necessary, in addition to what has been set forth already, to enable us to calculate the ending moments of nakshatras. The scheme of nakshatras is different in the *Sūrya* and *Ārya siddhāntas* from what it is by the *Brahma siddhānta* and *Siddhānta Sirōmani*. In the two former siddhāntas the nakshatras have equal spaces of 13 degrees 20 minutes each, whereas in the *Brahma siddhānta* and *Siddhānta Sirōmani* the nakshatra intervals are either one day, or half a day, or one and a half days, and in one case (*Abhijit*) one-third of a day. But the principle by which the ending moments of nakshatras are calculated is the same under all the siddhāntas; that is, each nakshatra is normally attendant on a particular tithi, and the ending moment of a nakshatra cannot be separated from the ending moment of the tithi on which it is attendant by more than a certain maximum interval. Accordingly, in section *s* of the Eye-table, under each lunar month, are given the shortest intervals between the new moon of that month and the ending moments of the several nakshatras belonging to that month. What the actual interval will be in a given year will depend on sections *t* and *u* of the Eye-table.

There is a fixed relation between the distance of the first new moon in the solar year from the commencement of that year and the interval by which the ending moment of any nakshatra during that year can be prolonged beyond the normal moment of occurrence of the nakshatra shown in section *s* of the Eye-table. In the year A.D. 1921–22 the first new moon in the solar year was 24·23 days distant from the commencement of the solar year. Supposing we want the mean ending moment at which nakshatra *Uttara Phalguni* (No. 12 nakshatra) ended in *Phalgun* month in the year 1921–22; section *t* of the Eye-table tells us that when the first new moon is 24 days distant from the commencement of the solar year, the nakshatra intervals throughout the year are prolonged by 0·41 day. Section *u* of the same table tells us that for 23 of a day added to the 24 days we should subtract ·02 of a day from 0·41, that is for this particular year the nakshatra intervals shown in table *s* were all prolonged by 0·39 day. Consequently the ending moment of *Uttara Phalguni* nakshatra in *Phalgun* month A.D. 1921–22, which, according to table *s*, should occur 15·33 days after the new moon beginning *Phalgun* month, occurred in the year 1921–22 after an interval of 15·33 + 0·39 = 15·72 days from the new moon beginning *Phalgun* month. The exact process of arriving at the actual ending moment of the nakshatra is given in the illustrative example, Problem III, p. 93.

EYE-TABLE, SECTIONS v, w, x.—*Shortest interval in days from new moon to ending moment of each yoga.*

32. This is the last portion of the Eye-table proper and shows how the ending moment of a *yoga* is to be calculated. The principle is the same as for nakshatras, i.e., there is a normal moment of occurrence for each *yoga*, determined with reference to the new moon which commences each lunar month; to this normal moment of occurrence we have to add the period of retardation determined by sections w and x of the Eye-table—only the retardations are longer in the case of *yogas* than in the case of nakshatras, the maximum being 4·11 days under *yogas* against a maximum of 2·21 days under nakshatras.

33. The *yoga* is not a very important element for the purposes of the epigraphist and the chronologist. The references to it in inscriptions and literary records are not many and are confined to the later centuries for which we generally have other means of verification in Vikrama and Śaka years. The *yoga* itself is an artificial conception being the joint space which would be travelled by the sun and the moon in a given period of time, supposing that these bodies travelled in opposite directions instead of, as they actually do, in the same direction. Consequently, just as the tithi or the natural elongation of the moon is the difference between the positions attained by the moon and sun at a given moment in the heavens, the *yoga* or the artificial combination of the two motions is the fictitious space which would be described by the sun and the moon if they were travelling from new moon to new moon in opposite directions instead of in the same direction. In the supposed case the sun and the moon together would do the 360 degrees of the ecliptic in 25·42 days, and the length of the *yoga* month is therefore 25·42 days. These 25·42 days are distributed among 27 *yogas* just as the nakshatra month of 27·33 days is distributed among 27 nakshatras, and the ending moment of each *yoga* is determined accordingly. A reference to a *yoga* in a literary work or an inscription necessarily implies that the framer of the record fixed the position of the *yoga* with reference to a panchāṅga, for he could not possibly have found a *yoga* by reference to the actual heavens except by a circuitous process of calculation; and hence the investigation of *yogas* is a matter of altogether secondary importance in historical and chronological research.

34. The following example shows how the ending moment of a *yoga* is determined by the eye-table.

Required to find the ending moment of Yoga Ganda in the month lunar Phālguna, A.D. 1921-22. We need the ☉'s *yoga* anomaly as well as the ☾'s.

	(1)	First new moon in solar year 1921-22 as in paragraph 22	..	..	..	24·23 days.
	(2)	Yoga correction appropriate to (1) according to Eye-table w and x, '77-°03 =	..	..	..	·74 "
(v)	(3)	Shortest interval from new moon at commencement of Phālguna mo. to yoga No. 10 Ganda	..	..	..	15·34 "
						40·31 "
(h)	(4)	Interval in days from 1st n.m. in S.Yr. to new ☾ at beginning of Phālguna month	..	..	..	295·31 "
	(5)	Days of Indian Solar year up to mean ending moment of yoga Ganda in lunar Phālguna, A.D. 1921-22	..	..	..	Total .. 335·62 "
m & p		Moon's anomaly at commencement of S.Yr. A.D. 1921-22	..	..	..	24·60 days.
(1)	Supra	..	..	..	..	+ 24·23 "
(e)	..	..	..	..	..	+ 19·76 "
(2) & (3)	..	..	..	..	..	15·34 + ·74 = + 16·08 "
						84·67 days.
(d)		Deduct 3 anom. months	..	..	..	82·66 "
						2·01 days.
(i)		Sun's <i>yoga</i> anomaly for 335·62 days (5) supra	..	..	..	— ·14 day.
(6)		Net moon's anomaly	..	..	..	1·87
(g)		Moon's <i>yoga</i> anomaly for	..	..	..	1·87 days.
						— ·14 day.
						335·34
(1)		As in paragraph 22 commencement of Indian solar year A.D. 1921-22	..	April	13·05	
				April	348·39	

By Eye-table q April 348 counted from April 1 of previous year = 1 + 13 = 14 March of next year. Therefore the ending moment of yoga No. 10 Ganda in Phālguna lunar month in A.D. 1921-22 was ·39 of a day or (by r), 23 ghaṭikas, 24 palas after mean sunrise on 14 March A.D. 1922.

SHORT METHOD FOR ASCERTAINING THE NAKSHATRA AND THE YOGA CURRENT AT ANY MOMENT.

35. For most purposes, including those of historical investigation, it is sufficient to ascertain the nakshatra or the *yoga* current at the ending moment, already ascertained, of a tithi; and this is done by means of the formulæ:—

(1) Nakshatra longitude = (Moon's *minus* Sun's longitude) *plus* Sun's longitude; or tithi longitude (i.e., no. of tithi × 120°) + Sun's longitude by Tab. P.A., p. 47 below.

(2) Yoga longitude = (Moon's *minus* Sun's longitude) $\text{plus } 2 \times \text{Sun's longitude}$; or tithi longitude (*i.e.*, no. of tithi $\times 12^\circ$) $+ 2 \times \text{Sun's longitude}$ by Tab. P.A., p. 47 below.

Thus in the case investigated on p. 95 of these tables, the nakshatra current at the ending moment of Āshāḍha sukla 12 in A.D. 1924–25 was $12 \times 12^\circ + *88.04^\circ = 232.04^\circ$, which shows that nakshatra Jyeshtha was then current.

Similarly the Yoga longitude was $12 \times 12^\circ + 2 \times *88.04^\circ = 320.08^\circ$, which shows that Yoga no. 25 Brahman had just begun.

EYE-TABLE, SECTION y.

36. Section y of the Eye-table shows (1) the collective duration in days from the first new moon in the solar year up to the ending moment of each tithi in every lunar month, and (2) the increase of the moon's anomaly up to the end of each mean tithi; this increase has to be added to the moon's anomaly at the first new moon in the solar year. It should be remembered, when using this section y, that an *adhika* month adds one to the number of lunar months in a year and that for instance in a year in which Āshāḍha is *adhika*, the collective duration up to the end of a tithi in Bhādrapada month should be looked for under Śrāvaṇa in section y.

The reader should accustom himself to think of lunar months as well as of nakshatras by their number; and in a year in which No. 4 month is *adhika*, Śrāvaṇa which is ordinarily No. 5 month will become No. 6 and information regarding tithis and nakshatras in that month should be looked for in sections y and s under ordinary No. 6 month (Bhādrapada). This is why every month column in the tables of nakshatras and yogas (sections s and v) is headed "ordinarily."

Whether a particular year contains an *adhika* month and what that month is, can always be readily ascertained from the following table.

Table for determining mean Adhika and mean Kshaya months.

37. The following table enables us to know whether there is an *adhika* month or a *kshaya* month in a year (see para 7, p. 2 *supra*) by mere inspection of the date of occurrence of the first new moon in a solar year:—

Name of Lunar Months.	Ending moments of Solar Months.	Periods of Lunar Months.	Limits of Adhika and Kshaya Months.
Vaiśākha ..	30.93528 d.	29.53059 d.	The lunar month noted in column 1 will be an <i>adhika</i> month if first New Moon in Solar Year occurs before 1.40469 d. " 3.29435 d. " 5.40852 d. " 7.35320 d. " 8.84124 d. " 9.75202 d. " 10.11477 d.
Jyeshtha ..	62.35555 d.	59.06117 d.	
Āshāḍha ..	94.00028 d.	88.59176 d.	
Śrāvaṇa ..	125.47555 d.	118.12235 d.	
Bhādrapada ..	156.49417 d.	147.65293 d.	
Āśvina ..	186.93555 d.	177.18353 d.	
Kārttika ..	216.82888 d.	206.71411 d.	The lunar month noted in column 1 will be <i>kshaya</i> if first New Moon in Solar year occurs after 10.07446 d. and before 10.11475 d. " after 9.86165 d. and before 10.07447 d. " after 9.77911 d. and before 9.86164 d.
Mārgaśīra ..	246.31916 d.	236.24470 d.	
Pausha ..	275.63694 d.	265.77529 d.	
Māgha ..	305.08499 d.	295.30588 d.	
Phālguna ..	334.90527 d.	324.83647 d.	The lunar month noted in column 1 will be <i>adhika</i> if first New Moon in Solar Year occurs after 9.77912 d. and before 10.06880 d. " after 10.06880 d. and before 10.89170 d.
Chaitra ..	365.25875 d.	354.36705 d.	

N.B.—All the figures in column 4 are obtained by subtracting the corresponding figures in column 3 from those in column 2.

Sunrise and Lagna.

38. Time is reckoned in Indian astronomy, in the first instance, from Lankā †sunrise, and corrections are then applied so as to arrive at the time reckoned from local sunrise. These corrections are three in number:—

- (1) A correction for terrestrial longitude;
- (2) A correction for equation of time;
- (3) A correction for the sun's tropical longitude.

* *Explanation.*—For determining the Sun's longitude (88.04° in the present case), we take first of all the ascertained number of days of the Indian Solar year and fraction of day at the ending moment of the tithi, *i.e.*, $91.96 - .03 = 91.93$ days. The Sun's longitude corresponding to this is found from Table P.A. which gives $88.54^\circ - .45^\circ$ as the Sun's actual longitude at the end of 92 complete days of the Indian Solar year. But our tithi ended at 91.93 days, *i.e.*, at 92 complete days less .07 day. For .07 of day the Sun's mean longitude may be taken as $.07^\circ$. So we have, for Sun's longitude at the ending moment of the tithi, $88.54^\circ - .43^\circ - .07^\circ = 88.04^\circ$.

† The actual occurrence of a *kshaya* month is not so regular as this. The anomalies and equations render the incidence of a *kshaya* month comparatively rare. The last *kshaya* was in A.D. 1822–23; the next is due in A.D. 1963–64. See the larger work, p. 29.

‡ Lanka is an imaginary island supposed to be situated on the equator on the meridian of Ujjain, the Indian Greenwich—*vide* p. 46 below.

39. To understand the nature of these corrections, we shall give in popular language the astronomical theory of local time, as applied by Indian astronomers.

(1) *Correction for terrestrial longitude.*—If the sun moved uniformly along the celestial equator, all places on earth would have sunrise at exactly 6 a.m., local time. On this supposition local time for any moment of the day could be deducted from Lankā time by adding or subtracting four times as many minutes of time as there are degrees of longitude between Lankā (or Ujjain) and the given place. The longitude of Ujjain being 76° east of Greenwich, any place whose longitude is more than 76° from Greenwich has a positive correction, and any place whose longitude is less than 76° has a negative correction for terrestrial longitude. For example: the longitude of Madras being $80\frac{1}{2}^\circ$ east of Greenwich, i.e., $4\frac{1}{2}^\circ$ more than Ujjain, local time at Madras is obtained from Lankā time by adding $4\frac{1}{2} \times 4 = 18$ minutes of time.

N.B.—A meridian of terrestrial longitude makes a revolution of 360° in 24 hours, that is, it revolves 1° in $(24 \times 60 \div 360 =) 4$ minutes. This interval of 4 minutes may be called the *time-difference* corresponding to a degree of terrestrial longitude.

The *time-difference* or correction for terrestrial longitude for nearly 200 important places in India (their importance being gauged by their population according to the Census Report of 1921) is given at the end of Table T.L., pp. 45, 46 *post*. The correction is given in seconds of time which can be converted into *palas* or *vinādis* by simply dividing the correction by 24.

(2) *Correction for equation of time.*—The sun does not move uniformly throughout the year. Hence, for each day of the solar year, we have to apply a correction which depends on the day's equation of the centre. The correction for each day of the solar year on account of the equation of time may be expressed in seconds of time.

(3) *Correction for the sun's tropical longitude.*—The sun does not move along the equator, as in our first supposition, but along the ecliptic; and therefore it is only at the points where the ecliptic cuts the equator, i.e., at the moments of vernal and autumnal equinox that the first supposition holds good. At other times of the year, a correction has to be applied, depending on the sun's tropical longitude, i.e., on his distance from either equinox measured along the ecliptic.

40. Now, how are we to determine the sun's tropical longitude? The longitude that is given in Table P.A. for any day of the Indian solar year is a sidereal longitude, i.e., the longitude of the sun measured from a fixed point of the ecliptic, which fixed point was the true vernal equinox about A.D. 500 or Kaliyuga 3600. Every year since then, the vernal equinox has been moving further and further away from that fixed point, and the sun's tropical longitude for any year subsequent to Kaliyuga 3600 must be found by adding to his sidereal longitude 3 degrees for every subsequent period of 200 years.* The tropical longitude for any day in any year is determined by adding to the day of the solar year 1 day for every 64 years expired since Kaliyuga 3740 (A.D. 639). Other *siddhāntas* give the precession as 1 day for every 60 years, which is more correct than 1 day for every 64 years.

By reckoning 3740 Kaliyuga and not 3600 Kaliyuga as the date of coincidence of the sidereal and tropical longitude, we eliminate the *sodhya* of 2:1707 days (*Sūrya siddhānta*); otherwise we would have to deduct the *sodhya* from the day of the solar year in order to arrive at the sidereal longitude and then add to the sidereal longitude so arrived at as many days as there were periods of 64 years since 3600 Kaliyuga. ($2:1707 \times 64 = 139:9248$, which is nearly 140.)

41. The sun's equation of the centre, according to Table P.A. on 0 day of the solar year, is $\pm 2:1378$ degrees, which is the sun's motion for 2:17 days. In other words, when the mean sun is at 0 day of the solar year, the actual sun has already done 2:17 days journey of his annual course. Therefore, whenever we wish to express in days the sidereal longitude of the sun, i.e., his distance from the position he occupied on 0 day of the mean solar year, we deduct the *sodhya* of 2:1707 days from the day of the solar year we are at.

42. For the year A.D. 1919 the tropical longitude is found by adding to the day of the solar year $\frac{1919-639}{64} = \frac{1280}{64}$, i.e., exactly 20 days, and this addition holds good strictly for 64 years, i.e., for 32 years before and 32 years after A.D. 1919 or from A.D. 1887 to A.D. 1951. For 6 important places in India, i.e., one for every five degree of North Latitude between 8° and 33° , the total of all the three corrections for the year A.D. 1919 is given in Table T.L. (pp. 40—44) for each day of the solar year. In this table the correction for tropical longitude which applies to the year A.D. 1919 may be assumed to apply to the whole of the period of 200 years from A.D. 1800 to 2000 instead of only to the period of 32 years before and after A.D. 1919. There is no great error in this assumption, but of course direct calculation may be made, if the reader so pleases, for each case under examination. Further, the same table gives the equivalence of English dates for all solar years which commenced on the 13th April; for other years we must make a *deduction* or *addition* according as the Indian solar year in question commenced *after* or *before* 13th April. Specimen problems for determining the moment of sunrise at any place in India will be found at the end of the book (pp. 94, 95.)

43. The reader should note carefully when the total of all the *three* corrections should be used and when the total of corrections (1) and (3) will suffice. When we merely want to know by how many seconds *local* sunrise preceded or followed 6 a.m., we should simply add up the second and third corrections, for here there is no need to consider the effect of terrestrial longitude. If the total correction is positive, sunrise precedes 6 a.m.; if the total correction is negative, sunrise is later than 6 a.m. Example III on p. 94 below illustrates this aspect of the problem.

* This is the correction for precession of equinoxes. The addition to be made to Indian sidereal longitudes on account of the precession of equinoxes is given in degrees in paragraph 59, page 26, Chapter V below for various epochs from A.D. 532 to A.D. 2032.

When we want to know how many seconds should be added or deducted from the ending moment of a *tiṭhi* or *nakṣatra*, of which we already know the Lankā time, i.e., the time relatively to Lankā sunrise, we should sum up all *three* corrections, and if the sum is positive we should add it to Lankā time, while if the sum is negative it should be subtracted from Lankā time.

44. *Lagna*.—Closely connected with the calculation of sunrise is that of the *lagna*, i.e., the portion of the ecliptic which appears at the eastern horizon at a particular moment of the day. At other times we might require to know the moment of the day when a particular portion of the ecliptic will be *lagna*. An example of the first kind of problem is—

“What is the *lagna* at the moment of a person's birth?”

N.B.—The portion of the ecliptic which is *lagna* or “*cut*” at the horizon at any given moment is ordinarily referred to as “the *lagna*.”

An example of the second problem is—

“At what moment of a day, suitable for marriage, will a particular sign of the Zodiac be *lagna*, so that the hour as well as the day most suitable for marriage may be determined?”

Specimen solutions of both these problems will be found at the end of the book (pp. 94, 95). The illustrations refer to the latitude of Madras but the same table gives the corrections for each day of the year for 5 other latitudes in India, viz., 8° (Trivandrum), 18° (Satara), 23° (Indore), 28° (Muttra) and 33° (Jhelum). The figures for any intermediate latitudes may be interpolated as in ordinary mathematical tables (see Preface, paras 5 and 6) and the corrections for terrestrial longitude given at pp. 45, 46 added to the two other corrections when necessary.

CHAPTER II.

THE ERAS NOW IN USE OR MET WITH IN INSCRIPTIONS.

45. In the following summary of Indian eras, adapted from Cunningham and other authorities, we give in each case the formula whereby a year of each era, “expired” or “current” as the case may be, may be obtained from the A.D. year, also noting where the era is or was in use, and whether it is *amānta* or *pūrṇimānta*, *Chaitrādi* or *Kārttikādi* and so forth.

(1) *Kaliyuga* (expired year = 3102 minus B.C. year; A.D. year + 3101). Used all over India as a solar (*Mēshādi*) and luni-solar (*Chaitrādi*) year. The years in this era are indicated in Eye-table k from 3102 B.C. to A.D. 2000; and they are regularly given with A.D., Śaka, and Vikrama equivalents, in the author's *Ephemeris from A.D. 700 to A.D. 1999*. (7 vols. 1922)

(2) *Saptarshi* (current year = A.D. year + 76). Mostly *current* and mostly *pūrṇimānta* and *Chaitrādi*. At present in use in Kāshmir and formerly in Multan and elsewhere. Quoted generally in cycles of 100 years. Thus A.D. 1910 = *Saptarshi* 1986, current, quoted only as “86 *Saptarshi*, current.”*

(3) *Vikrama era* (expired year = A.D. year + 57). Extensively used at present in Guzerat and all over Northern India, except Bengal; *Kārttikādi Amānta* in Guzerat, hence called *Southern Vikrama*; *Chaitrādi* and *Pūrṇimānta* in North India, hence called *Northern Vikrama*. Other names, “Malava era”; and also simply “*Samvat*.” The Vikrama years, expired, from A.D. 500 to A.D. 2000, are regularly shown in Table II, Vol. I, and from A.D. 700 to A.D. 1999 in subsequent volumes of the *Ephemeris*.

(4) *Śaka era* (expired year = A.D. year minus 78). Extensively used in India both in the past, and at present. *Mēshādi* (for solar year) and *Chaitrādi* (for luni-solar year): generally *amānta*, but *pūrṇimānta* in Northern India. Śaka equivalents of Kaliyuga and Vikrama years, expired, from A.D. 500 to A.D. 2000, are regularly given in Table II, Vol. I, and from A.D. 700 to A.D. 1999 in subsequent volumes of the *Ephemeris*. Current śaka years are often quoted in inscriptions, in which case the formula is, current śaka = A.D. year minus 77.

(5) *Kollam era* (current year = A.D. year minus 824). Used in Malabar, Cochin, and Travancore since A.D. 825. Begins in North Malabar with solar *Kanyā* and in South Malabar with *Chingam* (Simha); always *solar* and *current*. English equivalents for all Kollam years are regularly given in the *Ephemeris*.

(6) *Bengali san* (or *sen*) (current year = A.D. year minus 593). *Mēshādi*, *current solar year*. Now in use in Bengal. For A.D. 700 to A.D. 1999, B. san equivalents are regularly given in the *Ephemeris*.

(7) *Chedi* or *Kalachuri era* (current year = A.D. year minus 247), *current*, *Aśvinādi*, *pūrṇimānta*.

A.D. 300 = Chedi 53 current.

A.D. 800 = Chedi 553 current.

400 = „ 153

900 = „ 653 „

500 = „ 253

1000 = „ 753 „

600 = „ 353

1100 = „ 853 „

700 = „ 453

1200 = „ 953 „

Not now in use, but was in use under the Kalachuri kings in Western and Central India.

* The *saptarishis* are supposed (by an astronomical fiction) to occupy each *nakṣatra* for 100 years; in other words they go round the circle of the *nakṣatras* in 2,700 years. This convention is merely equivalent to our reckoning by centuries. Thus when Varāhamihira, quoting from Garga, says that the *rishtis* were in *Maghā* (*nakṣatra* No. 10) during the reign of Yudhishtira, he means that the epoch was removed by 7 centuries from another when the *rishtis* were in *Kṛttikā* *nakṣatra*; and if we suppose that the astronomical fiction of the longitudes of all heavenly bodies being 0 at 0 day in 0 year Kaliyuga, was applied to the *saptarishis* also, and that their 0 longitude was in *Kṛttikā* (which was an ancient reckoning), the later epoch referred to by Varāhamihira would be circa 2600 B.C. to 2400 B.C. and Varāhamihira's year-date for Yudhishtira's reign is actually A.D. 78 — 2526 years = 2449 B.C. See Paper (v) in the appendix to the larger work, and, p. 96 I of this

- (8) *Gupta* (current year = A.D. year minus 319).

A.D. 400 = Gupta 81 current.
 „ 500 = „ 181 „

A.D. 600 = Gupta 281 current.
 „ 700 = „ 381 „

Not now in use. Was in use in Central India and Nepal in the centuries above indicated as *current*, *Chaitrādi* *pūrṇimānta*.

- (9) *Valābhi era* (current year = A.D. year minus 318). *Current*, *Kārttikādi*, *amānta*, or *pūrṇimānta*.

A.D. 400 = Valābhi 82 current.
 „ 500 = „ 182 „
 „ 600 = „ 282 „
 „ 700 = „ 382 „
 „ 800 = „ 482 „

A.D. 900 = Valābhi 582 current.
 „ 1000 = „ 682 „
 „ 1100 = „ 782 „
 „ 1200 = „ 882 „
 „ 1300 = „ 982 „

Not now in use. Was in use in Kāthiavāḍ and neighbourhood in centuries above indicated.

- (10) *Vilāyati year* (current year = A.D. year minus 592). *Kanyādi*, *solar*, *current*.

Now in use in Orissa. Months begin invariably on the day of *sankrānti* instead of the next or the third day after. (See page 1, para 5 *supra*.)

This era bears to the Bengali san pretty much the same relation that the Valābhi bore to the Gupta era.

(11) *Amli year* (current year = A.D. year minus 592). *Luni-solar*, *current*. Lunar year changes in *Bhādrapada śukla 12th*, i.e., some days before, or some days after, *Kanyā sankrānti*. Otherwise the same as *Vilāyati*. *Current* in Orissa. Probably bears the same relation to *Vilāyati* that the luni-solar year in the Telugu country bears to the solar year of the Tamil country (i.e., only new year day is different in each case).

(12) *Fasli year* (luni-solar) in Bengal, and N.W. India (current year = A.D. year minus 592); *pūrṇimānta* and *lunar Aśvinādi* (i.e., it begins on *pūrṇimānta Aśvina, bahula pratipad*); luni-solar year for Bengal, just as the Bengal san is the solar year for the same tract of country. Like all luni-solar years, the *fasli* takes the number of the next solar san. Thus, A.D. 1900 was, Bengal san 1307 current, but the luni-solar *fasli* beginning on *Aśvina krishṇa pratipad* of A.D. 1900 takes the number of the next Bengal san, i.e., 1308 current. Hence the formula for Bengal *fasli* is “current A.D. year minus 592.”

(13) *Dakhan fasli* (current year = A.D. year minus 593) was up to A.D. 1556 when its number was 963, a Hijra year, but from that year forward it has been kept as a solar year (identical in number with Bengal san), beginning, in parts of Bombay, when the sun enters the nakshatra *Mṛgaśīras*,* i.e. (now) about 7th or 8th June. The months, their periods of beginning, and number of days are the same as in the Muhammadan calendar.

(14) The *Madras fasli* year is an *agricultural, solar, tropical* year, beginning on 1st July and having no divisions of its own into months and days. Its formula is “Current fasli = A.D. year minus 590.” The agricultural or revenue year from 1st July 1910 to 30th June 1911 might be expressed quite as well by the expression “Revenue year 1910-11” as by the expression “Fasli 1320.” The former expression would convey better sense to most people, and the expression “Fasli year,” the use of which a blind tradition has consecrated in Madras, serves no other purpose than to confuse any one who is not a village karnam or a Tahsildar. It is a chronological anomaly and will no doubt gradually drop out of use.

(15) The *Mahratta Sūr-san*, *shahūr-san* or *Arābi-san* (current year = A.D. year minus 599) was extensively used under the Mahratta supremacy, and is still occasionally met with. Begins, like the *Dakhan fasli*, when the sun enters the nakshatra *Mṛgaśīras*. *

(16) *Harshukāla era* (current year = A.D. year minus 606). Was current in *Muttra (Mathura)* in *Kanauj* and in *Nepal*. *Harsha* 94 current = A.D. 700, and so on.

(17) *Nevar era* (used in *Nepal* from A.D. 878 to A.D. 1768),
 expired, *Kārttikādi*, *Amānta*.

Nevar 21, expired A.D. 900.
 „ 821, „ „ 1700.

Formula “Nevar expired = A.D. year minus 879.”

(18) *Chalukya era* (expired year = A.D. year minus 1076). This was in use only from A.D. 1079 to A.D. 1162. It followed the śaka months and pakshas. *Chalukya* 24 expired = A.D. 1100.

(19) *Lakshmana Sena era*: (expired year = A.D. year minus 1108, according to present day almanacs). Now in use in *Tirhut* and *Mithila*, but along with the śaka or *Vikrama era*.

Dr. Kielhorn concludes that the formula for this era was (from A.D. 1194 to A.D. 1551). “Expired *Lakshmana Sena* year = A.D. year minus 1119.” According to this formula A.D. 1200 would be equivalent to *Lak. Sena* 81, expired. The years of this era were expired, *Kārttikādi*, *amānta*.

* By Eye-table 5 the sun enters nakshatra *Mṛgaśīras* when his longitude is 53°20'. The number of days corresponding to this (by Table P.A.) = 56. When the solar year commences (as it did in A.D. 1911) on 13th April, the sun's entry into *Mṛgaśīras* nakshatra would be on 56 + 13 = 69 days from 1st April, i.e., on 8th June.

(20) *Mahratta Rāja śaka era* (current year = A.D. year minus 1673) was established on the accession of Śivāji: the number of the year used to change every *Jyeshṭha śukla trayodaśī*, which was the tithi or date of Śivāji's accession. Otherwise same as southern luni-solar amānta śaka years.

(21) *Tārikhi-ī-Ilāhi* (=mighty or divine era), dating from the accession of Akbar (14th February 1556), fell into disuse temp. Shah Jehan. Days and months were solar, without intercalations.

CHAPTER III.

TITHIS IN RELATION TO FESTIVALS AND *vice versa*.

46. *Day on which a festival is celebrated.*—As a *tithi* generally covers a portion of two days, it sometimes happens that though for civil purposes the tithi of a day is that which is current at sunrise, (§ 10, page 3 *supra*), yet, for religious purposes, the tithi may have to be celebrated on the (previous) day when it begins. When a tithi is appointed for the celebration of a feast or fast, to be kept at forenoon, midday, late afternoon, midnight, etc., it is obvious that the feast or fast must be observed on the day when the tithi covers the prescribed part of the day. The day for such purposes is divided, first of all, into five portions *between sunrise and sunset*.

- (1) *Prāṭhikāla*, or early forenoon, 6 ghaṭikas from sunrise.
- (2) *Saṅgava*, or forenoon, 6 to 12 ghaṭikas from sunrise.
- (3) *Madhyāhna*, or midday, 12 to 18 ghaṭikas from sunrise.
- (4) *Aparāhna*, or afternoon, 18 to 24 ghaṭikas from sunrise.
- (5) *Sāyāhna*, or late afternoon, 24 to 30 ghaṭikas from sunrise.

(a) The 4 ghaṭikas before sunrise are called *arūṇodaya* or rise of dawn.

(b) The 6 ghaṭikas after sunset are called *pradosha* or evening.

(c) The 2 ghaṭikas in the middle of the night are called *nīṣīṭha*, midnight.

(d) A festival marked as *pūrvaviddha* is celebrated on the first day of the tithi, not on the second. A festival celebrated on the second day on which a tithi is current is said to be *pārvaviddha*.

N.B.—*Tithi drayam*.—Two tithis meeting, *i.e.*, one commencing and the other ending, between 18 and 21 ghaṭikas after sunrise, when a similar meeting does not take place next day.

47. *Festivals connected with nakshatras as well as tithis.*—On the nakshatra Śravisṭhā (No. 23) in lunar Śrāvaṇa, the ceremony of Upakarma (Āvaṇi Avittam) is celebrated. Eye-table, section s shows that this festival would ordinarily fall about full moon in Śrāvaṇa. In the same manner, all festivals associated with particular *nakshatras* may be equally well connected with particular *tithis*. In Southern India, however, it is usual to connect *nakshatra* festivals with certain *solar* months in which they are celebrated; *e.g.*, *Panguni Uttaram* (*i.e.*, *Uttara Phalgunī* nakshatra in the solar month called *Panguni*), *Chittirai Mūlam* (*i.e.*, *Mūla* nakshatra in the solar month called *Chittirai*); *Āvaṇi Avittam* (*vide supra*), etc. *Tithi* festivals are also often connected in Southern India with solar months; and if a festival falls, for instance, on śukla panchamī in a particular solar month, and there are two śukla panchamīs in that month, the first is called *sūnya tithi* and the second only is celebrated.

Occasionally something else is required for the celebration of a feast besides the concurrence of a *tithi* and a *nakshatra*; and there are also festivals and fasts which cannot conveniently be arranged under tithis. Such matters are arranged in the following alphabetical notes, which will be of interest to the general reader as well as to students of epigraphy.

48. *Amāvāsyā*: the Tarpaṇa or minor Śrāddha should be in *aparāhna*. If it occurs in *aparāhna* on two days, and is less than 60 ghaṭikas in length, it is kept on the first day; otherwise (*i.e.*, if of normal length or longer) on second day. If not occurring in *aparāhna* on two days, it should be kept on the first day. The same rule is observed for śrāddhas.

Śuklayajurveda.—Amāvāsyā is kept on the third day, before moonrise.

Time for yāgas (yājña kāla).—The last fourth part of a *parva* (*i.e.*, either amāvāsyā or purnamī) and first three parts of pratipad are suitable as *yāgakāla*. If there is yāgakāla on two days, then the day on which the kāla is current at noon is the proper day.

Chaturdaśī (14th tithi).—Bahula chaturdaśī in every month is *Śivarātri*, but Māgha ba. 14 is *Mahā Śivarātri*.

Chāturmāsya dvitīyās.—Bhādrapada ba. 2; Āshāḍha ba. 2; Phālguna ba. 2; Kārttika ba. 2.

The *bahula dvitīyā* in Āshāḍha, Śrāvaṇa, Bhādrapada and Āsvina is called *Asūnyasayana vrata* and the fast is broken at moonrise.

Ekādaśī (11th tithi).—Every ekādaśī is sacred, like every amāvāsyā, and receives a special name. It is called *Vijayā* when joined with the nakshatra "Punarvasū." The following are the names of the 24 ekādaśīs: (12 in bright halves and 12 in dark halves of the 12 lunar months):—

Month.	Śuklapaksha.	Bahulapaksha.
Chaitra	.. Kāmadā ekādaśī	.. Varūthini ekādaśī.
Vaiśākha	.. Mohini do.	.. Aparā do.
Jyeshṭha	.. Nirjalā do.	.. Yogini do.
Āshāḍha	.. Vishnuśayanotsava; Sayanī or Vishnuśayanī Kāmadā ..	do.
	ekādaśī (<i>i.e.</i> , Vishnu going to sleep).	or Kāmikā do.
Śrāvaṇa	.. Putradā ekādaśī	.. Ajā do.

Month.	Śuklapakṣa.	Bahulaṣpakṣa
Bhādrapada	Vishnuparivartanotsava or Parivartini ekādaśī (Vishnu turning on his side) called Vishnuśrinkhala, when 11th and 12th tithis meet in nakṣatra 'Śravaṇa.'	Indirā ekādaśī.
Āśvina	Pāśāṅkusa ekādaśī	Ramā do.
Kārttika	Prabodhini ekādaśī (waking of Vishnu). Bhishma panchakavratā commences.	Uṭṭarī do.
Mārgaśīrṣa	Mokṣadā ekādaśī	Saphalā do.
Pausha	Putradā ekādaśī or Mukkoṭṭi or Vaikuṇṭha ekādaśī.	Shaṭṭilā do.
Māgha	Jayā ekādaśī	Vijayā do.
Phālguna	Āmalakī ekādaśī	Pāpamochinī do.

(Vaishṇavas).—If *daśamī* ends after 56 ghaṭikas, the fast is on *dvādaśī* day. If on *ekādaśī* day, there is any part of *navamī* or *daśamī* day, then also the fast should be kept on *dvādaśī*. If *dvādaśī* touches three days, then the fast is on the day which is wholly *dvādaśī* and *pāraṇam* on the next day when *dvādaśī* ends. In any other case, *ekādaśī* is the fast day and *dvādaśī* the day of *pāraṇam*. Sanyāsins and widows of all creeds observe this rule for *ekādaśī*.

(Smārthas).—Even if *daśamī* ends after 56 ghaṭikas, the fast is kept on *ekādaśī*. If *dvādaśī* touches three days, Smārthas observe the first *dvādaśī* day as *ekādaśī*.

(Kāmyā ekādaśī).—Those who observe *ekādaśī* for *kāmya* purposes (begetting children, etc.) observe the Smārtha rule : those who observe *ekādaśī* for *mōksha* (like Sanyāsins) observe the Vaishṇava rule.

If a death occurs on the day of *ekādaśī* fast, whether it be *ekādaśī* or *dvādaśī* tithi, then the *śrāddha* is on the next day. Only Mādhvas and Tēngalai Vaishṇavas observe this rule : Smārthas and Vādgalai Vaishṇavas observe the *śrāddha* on *ekādaśī* fast day also.

Grahaṇa.—For 9 hours before commencement of a lunar eclipse, and for 12 hours before commencement of a solar eclipse, neither *śrāddha* nor meals are allowed : they are allowed after *mōksha*, i.e., release of the eclipsed body. On the occasion of a *grasthōdaya* eclipse of the moon (when moon rises in an eclipsed condition), neither *śrāddha* nor meals are allowed during day, and after *mōksha*, performers of pūrṇimā *śrāddha* must fast and perform *śrāddha* next day but others may have food at night. If the moon sets in an eclipsed condition, (*Grasthāsthānam*) meals are allowed only after next moonrise, except to the performer of *śrāddha*, who must fast in the night and perform *śrāddha* next day.

According to Manu, no *śrāddha* on account of a tithi can be performed at night, but *śrāddhas* on account of eclipse must be performed during the time of eclipse, even if it be at night.

Jayanti.

- | | |
|--|---|
| 1. Matsya jayanti—Chaitra su. 3 (<i>aparāhna</i>). | Sri Rāma jayanti—Chaitra su. 9 (<i>madhyāhna</i>). |
| 2. Kūrma jayanti—Jyēṣṭha su. 12 (<i>pradōsha</i>). | Balarāma jayanti—Bhādrapada su. 3 (<i>madhyāhna</i>). |
| 3. Varāha jayanti—Chaitra su. 9 (<i>aparāhna</i>). | Krishna jayanti—Śravaṇa ba. 8 (must be current at midnight). |
| 4. Nārasimha jayanti—Vaiśākha su. 13 (<i>pradōsha</i>). | 10. Bauddha jayanti, Kalki jayanti—Jyēṣṭha su. 3 (<i>pradōsha</i>). |
| 5. Vāmana jayanti—Bhādrapada su. 12 (<i>madhyāhna</i>). | |
| 6. Parasurāma jayanti—Vaiśākha su. 3 (between 6 and 9 p.m.). | |

Kalpādi.

- | | | |
|--|-----------------------------------|---------------------|
| Kūrma kalpādi—Chaitra su. 5 or Chaitra Amāvāsyā. | Praḷaya kalpādi—Mārgaśīrṣa su. 9. | |
| Pārthiva kalpādi—Vaiśākha ba. 3. | Varāha kalpādi—Māgha su. 13. | } <i>Pūrvāhna</i> . |
| Sāvitrī kalpādi—Kārttika su. 7. | Brahma kalpādi—Phālguna ba. 3. | |

Mādhva tīrthams and Pūnyadinams.—South of Madras, Mādhvas observe these commemorations as *aparāhna vyāpini* and North of Madras, they observe them as *udaya vyāpini*, because the days are not of birth but of death.

These festivals are associated with lunar months and tithis, and are inserted in the general list accordingly.

Manvādi.

- | | |
|----------------------------------|------------------------------------|
| 1. Svārochisha—Āśvina su. 9. | 8. Vaivasvata—Māgha su. 7. |
| 2. Svāyambhuva—Kārttika su. 12. | 9. Sūryasāvārṇi—Bhādrapada su. 7. |
| 3. Uttama—Chaitra su. 3. | 10. Rudrasāvārṇi—Āshāḍha ba. 8. |
| 4. Tāmasa—Bhādrapada su. 3. | 11. Indrasāvārṇi—Kārttika ba. 8. |
| 5. Agnisāvārṇi—Śravaṇa Amāvāsyā. | 12. Brahasāvārṇi—Phālguna pūrṇimā. |
| 6. Rāvata—Pushya su. 11. | 13. Rauchyaka—Chaitra pūrṇimā. |
| 7. Chākshusha—Āshāḍha su. 10. | 14. Bhauchyā—Jyēṣṭha pūrṇimā. |

N.B.—*Manvādi* and *Yugādi*, occurring in *Śuklapakṣa*, should be in *pūrvāhna*, i.e., before noon : if they occur in *kṛishṇapakṣa*, they should lie within *aparāhna*, i.e., afternoon.

Māsa Śivārātri.—Every month, ba. 14 (*pradōsha* or *pūrvaviddha*) is *Śivārātri*. See *Chaturdaśī*.*

Panchadaśī (15th tithi).—A śukla 15 or pūrṇimā (full moon) is called *Somavatī* when it falls on Monday and is special for donations. It is called *chāḍāmāṇī* when it is further joined with a lunar eclipse.

Most pūrṇimās receive special names, which are given in the general list.

Pāraviddha, a tithi kept on the day on which it ends.

Pratipad (1st tithi).—The Chaitra śukla *pratipad*, i.e., that which precedes the Mēsha sankrānti, is the beginning of the Hindu lunar year, new year's day (lunar) being that on which the pratipad is current at sunrise. (When there is an *adhika Chaitra*, that begins the year.) The tithi is therefore called *Vatsarārambha* (commencement of the year). It is also *Navarātrārambha*, there being another *Navarātrārambha* on Āśvina śukla pratipad.

Pūrvavidha.—A tithi kept on the day on which it begins, provided it begins more than 4 ghaṭikas before the sunset of one day and ends before sunset of following day.

Pushkara, or festival of a river, is celebrated when Jupiter enters certain signs of the zodiac. The signs for the 12 chief rivers are—

Jupiter in	Mēsha—Gangā.	Jupiter in	Tulā—Kāveri.
„	Rishabha—Revā.	„	Vṛiśchika—Bhimarathi.
„	Mithuna—Sarasvatī.	„	Dhanu—Pushkaram.
„	Karkāṭaka—Jamna.	„	Makara—Tungabhadra.
„	Simha—Gōdāvari.	„	Kumbha—Indus.
„	Kanvā—Krishna.	„	Mina—Sapranītantasi.

The moment of Jupiter's entry into a rāśi is the Pushkaram, and the period of the festival is 12 days. A rāśi into which Jupiter enters twice (i.e., before retrogression and after) is counted only at second entry.

N.B. —For time of entry of Jupiter into the several rāśis, during the years A.D. 1839 to A.D. 1999, see pp. 62 to 87 *post*.

Sankramaṇa.—When sankrānti occurs during daylight, it should be observed as closely as possible : if after sunset, it is kept on the first day in the case of sankrānti occurring before midnight : otherwise, next day. If at midnight, it may be kept, on either day. Rishabha, Simha, Vṛiśchika, Kumbha sankrāntis (sthirā rāśi sankrāntis) are called *Vishṇupāda*. Mithuna, Kanyā, Dhanu, Mina (dvīsvabhāva rāśis) are called *Shadaśīṭi puṇyakāla*.

Mēsha and Tulā sankrāntis are called Vishuvaṣ puṇyakāla. Karkāṭaka and Makara sankrāntis are called respectively Dakshināyanā and Uttarāyana puṇyakāla.

Sopapadas.—Jyeshṭha su. 2, Āśvina su. 10, Māgha su. 4 and 12 (*pūrvāhna*).

Tisroṣṭakas.—7th, 8th and 9th tithis in bahula paksha of Mārgaśīrsha, Pushya, Māgha, Phālguna (*aparāhna*).

Upākarma.—Śrāvaṇa su. 15 (*samgovayāpini* 6 ghaṭ. to 12). For Yajurvedis, if Sankramaṇa, Mūḍham, heliacal setting of Jupiter or Venus or eclipse occur then the upākarma is on Bhādrapada pūrṇimā ; if that also is objectionable, then the people observe it in Āshāḍha ; but this is not according to the śāstras, which require it in this case to be performed in Śrāvaṇa month.

“ Śrāvaṇa ” nakshatra is the date for Rigvedis, whether the tithi be su. 14 or 15 or ba. 1. For Vājasaneyis, pūrṇima must be *madhyāhna vyāpini*. In Simha month, “ Hasta ” day is upākarma for Sāmavedis south of the Narbāḍha. For those north of the Narbāḍha, “ Hasta ” nakshatra in Śrāvaṇa month is the appointed time.

Vatsarārambha—lit : beginning of the year, is the name given to Chaitra su. 1, which marks the commencement of the Hindu lunar year, and which is the su. 1 immediately preceding the Mēsha sankrānti. When there is an *adhika Chaitra*, su. 1 of that month begins the year. Pratipad is *pāraviddha*, i.e., it is kept on the day on which it ends. When pratipad is *kshaya*, it is kept on Amāvāsyā day : when it touches three days, it is kept on the third day.

Yogas—

Budhāshtamī.—Su. 8 + Wednesday in any month.

Ekādaśī Guruvāra vrata.—Ekādaśī + Thursday in any month and either paksha.

Sani trayodaśī.—Saturday + trayodaśī in any month and either paksha.

Kṛiṣṇāṅgāraka chaturdaśī vrata.—Kṛiṣṇa paksha 14 + Tuesday in any month (divavyāpini, i.e., must be between sunrise and sunset).

Strinām chandradarśanam.—The whole of the night from sunset to sunrise must be pūrṇimā without occurrence of chaturdaśī.

Amāvāsyā Sōmavāra vrata.—Monday + Amāvāsyā.

Bhānu saptamī.—Sunday + saptamī, any month and either paksha.

Angāraka Chaturthī.—Tuesday + chaturthī.

Ashtamī Sōmavāra vrata.—Monday + ashtamī.

Mahapaurṇamī vrata.—Moon and Jupiter should join in the nakshatra whence the month takes its name.

Mahāmāgha.—Saturn in Mēsha + Moon in “ Māgha ” + Jupiter in Simha + Sun in “ Śrāvaṇa ” nakshatra.

} Tithi must be current at sunrise and noon
(divavyāpini).

Mahavyatipāta—*Jupiter* and *Mars* in *Simha* + *Venus* in *Mēsha* + *su. 12* + “*Hasta*” *nakshatra* in any month.
Govindadvādaśī—*Sun* in *Kumbha* + *Jupiter* in *Dhanus* + *Śukha* (i.e., *auspicious*) *tithi*, *vāra*, and *nakshatra* in *Phālguna śukla paksha* : otherwise *Sun* in *Kumbha* + *Saturn* in *Makara* + *su. 12* + “*Pushya*” *nakshatra*.
Kūhayaṅga—*Tyājya* at meeting of *Amāvāsyā* and *pratipad*.

Yugādi—

Kritayugādi—*Kārttika* *su. 9*.

Tretayugādi—*Vaiśākha* *su. 3*.

Dvāparayugādi—*Māgha Amāvāsyā*.

Kaliyugādi—*Bhādrapada* *ba. 13*.

Manvādi and **Yugādi** occurring in *śukla paksha* should be in *pūrvāhna*, i.e., before noon : if they occur in *kṛishṇa paksha*, they should be within *aparāhna*, i.e., afternoon.

Yugānta—

Kretayugānta—*Simha* sankrānti.

Tretayugānta—*Vṛiśchika* “

Dvāparayugānta—*Rishabha* “

Kaliyugānta—*Kumbha* “

} Same rule as for sankrānti q.v. as regards time of day.

49. Table of Hindu fasts, feasts and festivals—

Note.—The sign + means “combined with.” The abbreviation “when +” means “when the tithi in question is combined with.” *Asterisks* refer to the alphabetical list prefixed to this table.

Chaitra.

Su. 1. *Chāndra Vatsarārambha*. *Navarātrārambha* *Nimbakusuma* *pakshana*.

Su. 1. *Vēdavyāsa Tīrtham* (*Mādhvas*).

Su. 3. *Āndōlana-tritīyā (pūrvaviddha)*. *Gauri-tritīyā Matsajayanti* (afternoon). *Manvādi*.

Su. 5. *Lakshmi panchamī* or *Srīpanchamī (pūrvaviddha)*. *Kalpādi ** (*pūrvāhna*).

Su. 8. *Bhavāni-utpatti (pūrvaviddha)*; bathing special when + *Wednesday* + *Nak. “Punarvasū.”* *Āśokāshṭami*.

Su. 9. *Rāma navami* or *Śrīrāma jayanti (madhyāhna)*. *Varāha jayanti* *aparāhna* *Kavindira tīrtham* (*Mādhvas*).

Su. 10. *Dharmarāja daśamī*.

Su. 11. *Dōlotsava*. *Kāmadī ekādaśī*. See *Ekādaśī*.

Su. 12. *Vāmaṇa dvādaśī*. *Jayū*; when + *nakshatra “Pushya.”* See *Dvādaśī **

Su. 13. *Madana trayōdasi (pūrvaviddha)* or *Ananga pūjāna vrata*; god of love worshipped. *Satyavrata tīrthānām puṇyadinām* (*Mādhvas*).

Su. 15. *Damanakōtsava (pūrvaviddha)*; special for bathing when + *Sunday*. *Thursday* or *Saturday*. *Manvādi ** (forenoon). *Hanumatjayanti*. *Vīrarāghava tīrthānām puṇyadinām* (*Mādhvas*).

Ba. 3. *Vāḡīsa tīrthānām puṇyadinām* (*Mādhvas*).

Ba. 11. *Varūthini ekādaśī*. *Satyavijaya tīrthānām puṇyadinām* (*Mādhvas*).

Ba. 13. *Vārūṇi*; when + *Nak. “Śatabhishaj.”* *Mahāvārūṇi*; when + *Nak. “Śatabhishaj”* + *Saturday*. *Mahā-mahāvārūṇi*; when + *Nak. “Śatabhishaj”* + *Saturday* + *Yoga Śubha*. *Satyapriya tīrthānām puṇyadinām* (*Mādhvas*).

Ba. 15. *Kalpādi **

Vaiśākha.

Su. 3. *Akshayatritīyā (pūrvaviddha)*; special when + *Wednesday* + *Nak. “Rohini.”* *Trētayugādi*. See *Yugādi **. *Paraśurāma jayanti*.

Su. 4. *Vidyādhiraṇa tīrtham* (*Mādhvas*).

Su. 5. *Sankara's birthday*.

Su. 6. *Rāmachandra tīrtham* (*Mādhvas*).

Su. 7. *Gangā saptamī* or *Gangōtpatti*; birth of *Gangā*; midday.

Su. 11. *Paraśurāma ekādaśī*. *Mōhini Ekādaśī*.

Su. 12. *Vyatipāta* (when *Nak. “Hasta”* + *Jupiter* and *Mars* in *Simha* + *Sun* in *Mēsha*).

Su. 13. *Narasimha jayanti (pradōsha)*.

Su. 14. *Narasimha jayanti*.

Su. 15. *Vaiśākhi pūrṇimā*. *Sampat Gauri vrata (pūrvaviddha)*. *Kūrma jayanti (pradōsha)*. See *Jayanti **. *Mahā-Vaiśākhi*; when *pūrṇimā* + *Sun* in *Mēsha* + *Jupiter* in *Dhanus* + *Mars* in *Makara* + *Saturn* in *Tulā* + *Nak. “Viśākha”* + *Variya yoga* + *Sunday*.

Ba. 3. *Kalpādi ** (*pūrvāhna*).

Ba. 11. *Aparā ekādaśī*.

Jyeshṭha.

- SU. 2. Sopapada. Satyasandha tīrtham (Mādhvas).
 SU. 3. Rambhā-tritīyā (*pūrvaviddha*); worship of Bhavāni. Buddha jayanti. Kalki jayanti (*pradōsha*).
 SU. 6. Aranya Gaurī vratam (*pūrvaviddha*).
 SU. 10. Daśaharā (expiation of ten sins), or Gangāvatāra. Jyeshṭha SU. 10 + Wednesday (or Tuesday) + Nak. "Hasta" + Yoga "Vyatipātī" is called DAŚAHARĪ.
 SU. 11. Nirjalā ekādaśī.
 SU. 12. Rāmalakshmaṇa dvādaśī. Kūrma jayanti* (*pradōsha*).
 SU. 15. Rishabha pūja. Mahājyeshṭhā (*Jupiter* in Aindra, i.e., Nak. "Jyeshṭhā" + Moon in Aindra or Nak. "Jyeshṭhā" + Sun in Nak. "Rohinī" + Jyeshṭhā pūrṇimā. Manvādī* and Vaṭa Pūrṇimā or Vaṭa Sāvitrī (*pūrvaviddha*).
 BA. 2. Satyā pūrṇa tīrtham (Mādhvas).
 BA. 3. Raghu variya tīrtham (Mādhvas).
 BA. 8. Trilōchana pūja.
 BA. 11. Yoginī ekādaśī.
 BA. 14. Satyābhinava tīrtham (Mādhvas).
 BA. 15. Vaṭa Sāvitrī vratam (*pūrvaviddha*).

Ashāḍha.

- SU. 2. Ratha-yātra dvitīyā or Rāmarathōtsava.
 SU. 3. Satyādhirāja tīrtham (Mādhvas).
 SU. 5. Skanda-panchamī (*pūrvaviddha*).
 SU. 6. Kumāra shashṭhī (*pūrvaviddha*).
 SU. 7. Vivasvat saptamī; (when + Nak. "Pūrva-Phalgunī").
 SU. 10. Lakshmīvratārambha. Śāka vratārambha. Manvādī* (forenoon).
 SU. 11. Sayana ekādaśī (not to be observed in adhika month); or Viṣṇuśayana ekādaśī or Viṣṇuśayanōtsava; (i.e., Viṣṇu going to sleep).
 SU. 12. Gōpadma vratārambha. Chāturmāsya* vrata commences.
 SU. 14. Pavitrārōpanam (*pūrvaviddha*). See *Upākarma*.*
 SU. 15. Vyāsapūrṇimā (6 to 9 ghat. after sunrise). Hariśayanam. (*Sāyāhna-yāpinī*). Manvādī* Śivaśayanotsava or Kōkila vrata or Vyāsapūja.
 BA. 2. Chāturmāsya dvitīyā.* Asūnyaśayana vrata; fast broken at moonrise.
 BA. 3. Śrīvijaya tīrtham (Mādhvas).
 BA. 7. Special, when + Nak. "Revatī" + Tuesday.
 BA. 8. Manvādī*
 BA. 11. Kāmādā or Kāmika ekādaśī. v. *Ekādaśī*.*
 BA. 12. Pāpanāśini, when + Nak. "Rohinī." See *Dvādaśī*.*
 BA. 15. Satyādīśa tīrtham (Mādhvas).

Śrāvaṇa.

- SU. 3. Madhu-Śravā (in Guzerat).
 SU. 5. Nāgapanchamī (*pūrvaviddha*); worship of snakes.
 SU. 6. Sūryashashṭhī (*pūrvaviddha*). Hala-shashṭhī.
 SU. 7. Satyavara tīrthānām puṇyadinam (Mādhvas).
 SU. 10. Dadhivratārambha.
 SU. 11. Putradā ekādaśī.
 SU. 12. Dāmōdara dvādaśī, Viṣṇoh-pavitrārōpanam.
 SU. 14. Varalakshmi vrata, on Friday, nearest to pūrṇimā in śuklapaksha.
 SU. 15. Hayagrīvōtpatti; Upākarma.* Rig-yajuh-Śrāvaṇī. Raksbābandhana (tying a string round the arm), or Rakipūrṇimā; or Nāralipūrṇimā (when cocoanuts are thrown into the sea). Hayagrīva jayanti; or Hayagrīvōtpatti.
 BA. 2. Asūnyaśayana vrata. See "Chāturmāsya dvitīyā"*. Rāghavendraswāmī puṇyadinam (Mādhvas).
 BA. 3. Kajjali-tritīyā.
 BA. 4. Bahuja chaturthī; when cows are worshipped.
 BA. 7. Sitalā saptamī or Sitalā-vrata (*pūrvaviddha*).
 BA. 8. Jānmāshṭamī. Krishnāshṭamī or *Krishna-jayanti*. Special when + Nak. "Rohinī"; less so when joined only to Monday or Wednesday Manvādī.* Vaishnavas observe this invariably in Simha month.

- BA. 11. Ajā ekādaśī.
 BA. 12. Jayantī; (when + Nak. "Punarvasū"). See Dvādaśī.*
 BA. 13. Satyadhṛma tīrthānām puṇyadinam (Mādhvas).
 BA. 15. Pithori or Kuśotpatinī (end of Śrāvaṇa). Manvādī.*

Bhādrapada.

- SU. 1. Maunavratam (*pūrvaviddha*).
 SU. 3. Shōḍaśomavratam. Varāha jayanti (see *Jayanti**). Haritālīka; worship of Pārvatī. Manvādī.* Śivā (a name for this tithi). Bālārāma jayanti (*madhyāhna*).
 SU. 4. *Vināyaka chaturthī* (*madhyāhnavyāpini*) Spl. when + Sunday or + Tuesday.
 SU. 5. Rishipanchami (*aparāhnavyāpini*).
 SU. 6. Champa shashthī (when + Nak. "Viśākhā" + Yoga Vaidhṛti + Tuesday). Sūrya shashthī (*pārvaviddha*) or Śkanda shashthī.
 SU. 7. Amuktābharaṇa saptamī (*pūrvaviddha*). Jayasaptamī Aparājitā. Manvādī.*
 SU. 8. Dūrvashtamī (*pūrvaviddha*). Jyeshthā puja (when + Nak. "Jyeshthā"). Jyeshthā-Gaurī-pūja-vrata when + nakshatra "Jyeshthā."
 SU. 9. Nandanavamī. Adhukha-navamī.
 SU. 10. Kshīravratārambha. Satyāshthakāma tīrthānām puṇyadinam (Mādhvas).
 SU. 11. Vishṇu parivartanōtsava or Parivartana ekādaśī. Lakshminārāyaṇa Yoga.
 SU. 12. Kalki-dvādaśī. Sakrottāpanam. Vāmaṇa-jayanti (*madhyāhna*) (see *Jayanti**). Śrāvaṇa-dvādaśī (when + Nak. Śrāvaṇa + Wednesday). Vijaya, (when + Nak. "Śrāvaṇa"). See Dvādaśī.*
 SU. 14. Anantavratam or Anantapadmanābha Chaturdaśī (*pūrvaviddha*); must be current for 3 muhūrtas, i.e., 6 ghaṭikas, after sunrise; and for those who perform this vrata for the first time, the tithi must be current at noon.
 SU. 15. Praushthapadī pūṇimā or Śrāddha.
 BA. 1. Mahālayapakshārambha. (Mahālaya when + Nak. "Bharaṇi" in *aparāhna*).
 BA. 2. Asūnyaśayana-vrata. "Chāturmāsya dvitīyā."*
 BA. 3. Brihatyuma vratam (*pārvaviddha*).
 BA. 6. Chandrashtāthivratam. Kapila shashthī (when + Nak. "Rōhinī" + Yōga "Vyatīpātā" + Sun in "Hasta" + Tuesday).
 BA. 8. Rudrāshṭamī (*pradōshakālā vyāpini*). Madhyāshṭamī. Mahālakshmvrata (*pūrvaviddha*). Ashṭaka Śrāddha.
 BA. 9. Durgā navamī (in Mahārāshtra). Gajagaurī vratam (when + Sun entering nakshatra "Hasta").
 BA. 10. Harisankara Yōga (*pūrvaviddha*), when there is a concurrence (1) of ba. 9 and ba. 10, (2) of Nak. "Punarvasū" and Nak. "Pushya," (3) of "Śivayōga" with "Siddhayōga," and (4) of "Garijakarāṇa" with "Vanijakarāṇa"; for 8 ghaṭikas by day or night; may be kept in *adhika* months.
 BA. 11. Indrā ekādaśī.
 BA. 12. Yātimahālaya (*aparāhna vyāpini*). Jayā (see Dvādaśī*).
 BA. 13. Gajachchāyā (when + Sun in "Hasta" + Nak. "Maghā"). Kaliyugādi. See *Yugādi**. Maghā trayōdaśī (Nak. "Maghā").
 BA. 14. Vishaṣastrahatānām Mahālaya.
 BA. 15. Sarvapitṛi or Mahālaya Amāvāsyā. Special, when Sun and Moon are both in Nak. "Hasta." Mādhava tīrthānām puṇyadinam (Mādhvas).

- SU. 1. Chaṇḍipūjārambha or commencement of Navarātri (*pārvaviddha*). Stanavridhi Gaurī vratam.
 SU. 5. Upāngalalita Gaurī vratam: esp. in Mahārāshtra (*pūrvaviddha*). Sarasvatipūjārambha ("Mūla" Nak.). Lalitā panchamī.
 SU. 7. About this tithi, when it concurs with Nak. "Mūla," Sarasvatī is worshipped. Satyaprayāṇa tīrthānām puṇyadinam (Mādhvas).
 SU. 8. Mahāshṭamī (Spl. when + Tuesday). Satyaparākrama tīrthānām puṇyadinam (Mādhvas).
 SU. 9. Mahānavamī (*pūrvaviddha*) or Durgā-navamī Manvādī.* Āyudha pūja.
 SU. 10. Vijayadaśamī or Daśara (*pūrvaviddha*); (Spl. when + Nak. "Śrāvaṇa). Rājnyā pattābhishheka (*pārvaviddha*). Sarasvatipūja (ends in "Śrāvaṇa" Nak.) Dvidala vratārambha. Buddha-Jayanti (See *Jayanti**). Sopapada.
 SU. 11. Pāsāṅkuśa ekādaśī.
 SU. 12. Padmanābha dvādaśī, Gōdvādaśī (*pradōsha vyāpini*). Vijayā (when + Nak. "Śrāvaṇa"). See Dvādaśī.*
 SU. 15. Dhanaphalavratārambha, when + Sunday. Kaumudyutsava (*pūrvaviddha*). Kojāgari pūṇimā or Kojāgari vrata; worship of Lakshmi and Indra. Games of chance. Navāṇa pūṇimā (when new grain is cooked).

- BA. 2. Āsūnyaśayana-vrata. See "Chāturmāsya dvitīyā." *
- BA. 3. Chandrōdaya Māsa vratam (*pārauddha*).
- BA. 11. Ramā ekādaśī.
- BA. 12. Gōvatsa dvādaśī.
- BA. 13. Dīnanatrayodaśī; when money-lenders worship money.
- BA. 14. Narakachaturdaśī (*pūrvavuddha*) or Dipāvalipāṇam, Dipadānam. Svātyabhyanga (at moonrise)
N.B.—Dipāvali is special on this tithi if joined to Nak. "Svāti."
- BA. 15. Kōdāra vratam (*pārauddha*).

Kārttika.

- SU. 1. Balipratipad or Balipūja.
- SU. 2. Yamadvitīyā (*aparāhnavyāpinī*) or Bhrātrīdvitīyā.
- SU. 3. Ālōchana Gaurī vratam (*pārauddha*).
- SU. 4. Nāga chaturthī (*pārauddha*; *madhyāhna vyāpinī*).
- SU. 6. Mahāshashthī; special for feeding of Brahmans when it falls on Tuesday.
- SU. 7. Kalpādi* (*pūrvāhna*).
- SU. 8. Gō-ashtamī (*pārauddha*).
- SU. 9. Kretāyugādi. See *Yugādi*.*
- SU. 10. Satyavara tīrthānām puṇyadinam (Mādhvas).
- SU. 11. Bōdhana ekādaśī or Prabōdhini ekādaśī. Bhīshmapanchaka vrata. Vedanidhi tīrthānām puṇyadinam. (Mādhvas.)
- SU. 12. Yōgeśvaradvādaśī. Kshirābdi mahōtsava. Chāturmāsya vrata* (begins). Prabōdhōtsava or Utthāna dvādaśī (preparation for waking Vishṇu). Tulasī vivāha. Manvādi.*
- SU. 14. Vaikuṇṭha chaturdaśī—midnight (*rātrivyāpinī*). Tulasī vratodhyāpanam.
- SU. 15. Special (when + Nak. "Kṛittikā"). Jvālātoranam (*pradōsha vyāpinī*). Dhātṛi yōga (when + Nak. "Kṛittikā"). Manvādi* Chāturmāsya vrata (ends). Tripurī pūrṇimā or tripurōtsava. Mahākārttikī (when + Nak. "Rohiṇī"), or when *Moon* and *Jupiter* are both in Nak. "Kṛittikā" on Kārttika su. 15. Pādmakayoga (when + *Sun* in Nak. "Viśākha" + *Moon* in Nak. "Kṛittikā"). *Kṛittikā* festival.
- BA. 2. Kārttika "Chāturmāsya dvitīyā." *
- BA. 3. Vidyānidhi tīrthānām puṇyadinam (Mādhvas).
- BA. 8. Krishnāshṭamī v. *Ashṭamī*.* Kāla-Bhairavāshṭamī or Kāla-Bhairava jayanti. Manvādi.*
- BA. 11. Utpattī ekādaśī.
- BA. 13. Yamadīpa (*pradōsha vyāpinī*).
- BA. 14. Padmanābha tīrthānām puṇyadinam (Mādhvas).

Mārgaśīrsha.

- SU. 5. Nāgapūjā or Nāgapanchamī.
- SU. 6. Skanda shashthī (*pūrvavuddha*), or Mahā shashthī. Champa shashthī; Śiva worshipped as Khandoba. Spl. when + Sunday or Tuesday + Nak. "Śatabhishaj" or + Yoga "Vaidhriti."
- SU. 7. Mitra saptamī (*pūrvavuddha*). Sūryavrata.
- SU. 9. Kalpādi (*pūrvāhna*).
- SU. 10. Satyanidhi tīrthānām puṇyadinam (Mādhvas).
- SU. 11. Mōkshadā ekādaśī. Satyanātha tīrthānām puṇyadinam (Mādhvas).
- SU. 12. Matsya-dvādaśī. Akaṇḍa dvādaśī vratam.
- SU. 13. Hanumad vratam (*Abhijitvyāpinī*).
- SU. 14. Pāshāṇapakshana (*pradōshavyāpinī*), or Pāshāṇa chaturdaśī. Dattātreya jayanti (in some places; elsewhere it is su. 15).
- SU. 15. Spl. for donations of salt, when + Nak. "Mṛgaśīrsha." Chandra Pūjā (*pradōsha*). Śiva Pūjā ("Ārdra" Nak.). Dattātreya or Dattajayanti. Ārdra festival.*
- BA. 1. Raghunātha tīrthānām puṇyadinam (Mādhvas).
- BA. 5. Akshobhya tīrthānām puṇyadinam (Mādhvas).
- BA. 7. Tisroshṭaka* (*aparāhna*).
- BA. 8. Kālabhairava Ashṭamī (*rātrivyāpinī*). Ashṭaka-Śrīddha. Tisroshṭaka* (*aparāhna*).
- BA. 9. Tisroshṭaka (*aparāhna*).
- BA. 11. Saphala ekādaśī.

Pausha.

- Su. 8. Spl. when + Wednesday + Nak. "Bharanī"; † "Rohini" or "Ārdra," according to some.
 Su. 11. Putradā ekādaśī or *Mukkoṭṭi Ekādaśī* or *Varkuṇṭha Ekādaśī*. Manvādi. * Raghūttama tīrthānām puṇyadinam (Mādhvas).
 Su. 12. Kūrma dvādaśī.
 Ba. 6. Satyakāma tīrthānām puṇyadinam (Mādhvas).
 Ba. 7. Tisroṣṭaka* (*aparāhna*). Naraharītīrthānām puṇyadinam (Mādhvas).
 Ba. 8. Tisroṣṭaka* (*aparāhna*). Aṣṭaka Śrāddha.
 Ba. 9. Tisroṣṭaka* (*aparāhna*).
 Ba. 11. Śaṭṭilā ekādaśī.
 Ba. 14. Vidyādīśa tīrtham.
 Ba. 15. Ardhodaya; when + Sunday + Nak. "Śravaṇa" + yoga "Vyatīpāta." The tithi is called *Mahōdaya*, when any one of the above special features is wanting and the others are present. Purandharadāśa tīrtham (Mādhvas).

- Su. 4. Tila chaturthī or Kuṇḍa chaturthī (*pūrvaviddha*). Sōpapada.
 Su. 5. Madana panchamī (*pūrvaviddha*). Vasanta panchamī; worship of Ratī and Kēma in forenoon; or Sripanchamī.
 Su. 7. Rathasaptamī (*pūrvaviddha*) or Mahāsaptamī Chandravarkavratam. Manvādi.*
 Su. 8. Bhīṣmadarpaṇam (*pūrvaviddha*). Bhīṣmāṣṭamī.
 Su. 9. Madhva navamī or Ananta tīrthānām puṇyadinam (Mādhvas).
 Su. 11. Bhīṣmapanchakam. Jayā Ekādaśī.
 Su. 12. Bhīṣmadvādaśī or Varāhadvādaśī. Sōpapada.*
 Su. 13. Kalpādi* (*pūrvāhna*).
 Su. 15. Mahā Māghī; when *Moon* and *Jupiter* are both in Nak. "Maghā."
 Ba. 7. Tisroṣṭaka.*
 Ba. 8. Tisroṣṭaka.* Aṣṭaka Śrāddha.
 Ba. 9. Rāmadāśa navamī. Tisroṣṭaka.*
 Ba. 11. Vijaya ekādaśī.
 Ba. 12. Tilā dvādaśī or Vijaya when + Nak. "Śravaṇa."
 Ba. 14. *Mahāśivarātri*—midnight nearest ba. 14, when Nak. "Śravaṇa" is current; spl. when + yoga "Śiva" + Sunday or Tuesday.
 If Nak. "Śravaṇa" is current at two successive midnights, the second is *Śivarātri*.
 Ba. 15. Dvāparayugādi. See *Yugādi*.*

Phālguna.

- Su. 3. Vādirāja Swāmigaḷ puṇyadinam (Mādhvas).
 Su. 4. Śānta chaturthī (*pūrvaviddha*).
 Su. 6. Satyavrata tīrthānām puṇyadinam (Mādhvas).
 Su. 11. Āmalakī ekādaśī.
 Su. 12. Narasimhadvādaśī.
 Su. 13. Kāmadahanam (*pūrvaviddha*) at midnight.
 The concurrence of Sunday, Saturday, Tuesday or Friday is an objection to the feast: *chaturdaśī* (su. 14) is then the proper day. If that also is objectionable then this festival is celebrated at that midnight at which Nak. "Pūrva Phalgunī" is current.
 Su. 15. Helikōtsava (*sāyāhna vyāpinī*). Manvādi.*
 Holikā or Hutāśani pūṇimā. In South India, Kāman Paṇḍigai, commemorating the destruction of Cupid or Kāmadēva by Śiva.
 Ba. 1. Vasantōtsava. Satyabōdha tīrthānām puṇyadinam (Mādhvas).
 Ba. 2. Chāturmāsya dvitīyā.*
 Ba. 3. Kalpādi* (*pūrvāhna*).
 Ba. 4. Vyāsarāyaswāmigaḷ puṇyadinam (Mādhvas).
 Ba. 5. Rangapanchamī; when colours are thrown about.
 Ba. 7. Tisroṣṭaka.*
 Ba. 8. Tisroṣṭaka.* Aṣṭakaśrāddha.
 Ba. 9. Tisroṣṭaka.*
 Ba. 11. Pāpamōchini ekādaśī.
 Ba. 13. Vārūṇī when + Nak. "Śatabhishaj."
 Mahā-Vārūṇī, when + Nak. "Śatabhishaj" Saturday.
 Mahā-Mahā-Vārūṇī, when + Nak. "Śatabhishaj" + "Yoga Śubha."
 Ba. 15. Manvādi.*

50. Feasts, Fasts and Festivals arranged in order of tithis.—

Pratipad (Tithi I).

The Chaitra śukla *pratipad*, i.e., that which precedes the Mēsha Sankrānti, is the beginning of the Hindu lunar year, New Year's Day (Lunar) being that on which the pratipad is current at sunrise. (When there is an *Adhiko Chaitra*, that begins the year.) The tithi is therefore called *Vatsavārambha* (commencement of the year). It is also *Naxarātrārambha* there being another *Naxarātrārambha* on Āśvina śukla *pratipad*.

Kārttika śukla 1 is *Bali-pratipad* or *Bali-pūjā* and it is *pūrvaviddha* as to time.
 Bhādrapada bahula 1 is *Mahālayārambha*.
 Phālguna bahula 1 is *Vasantōtsava*.

Dvitiyā (Tithi II).

Āshāḍha śukla 2 is *Ratha-yātra dvitiyā* or *Rōma-nahōtsava*.
 Kārttika śukla 2 is *Yama dvitiyā* or *Bhrūrī-dvitiyā* (because sisters make presents to brothers), and the time is afternoon.

The bahula dvitiyā in Āshāḍha, Śrāvaṇa, Bhādrapada and Āśvina is called *Asūnyaśayannavrata* and the fast is broken at moonrise.

Tritiyā (Tithi III).

Chaitra śukla 3 is *Gaurī-tritiyā*; also *Matsa-jayantī* (afternoon); also *Manvādī* (forenoon).
 Vaiśākha śukla 3 is *Kalpāntī* (forenoon); *Tretāyugādī* (forenoon); *Akshaya-tritiyā* special, when combined with Wednesday and Nak. Rōhiṇī; time (forenoon); also *Paraśurāma jayantī*.
 Jyēṣṭha śukla 3 is *Rambhā-tritiyā*, when Bhavāni is worshipped at *pūrvaviddha*.
 Śrāvaṇa śukla 3 is *Madhu-sravā* in Guzerat.
 Śrāvaṇa bahula 3 is *Kajjali-tritiyā*.
 Bhādrapada śukla 3 is *Varāha-jayantī* (afternoon); *Haritālīkā*, when Parvati is worshipped; *Manvādī* (forenoon).
 The tithi is by some called *Sisā*.
 Phālguna bahula 3 is *Kalpāntī* (afternoon).

Chaturthī (Tithi IV).

The śukla Chaturthī in every month is called *Ganēśa Chaturthī* or *Vināyaka Chaturthī*, the chief being *Māgha Chaturthī* (*Ganēśa jayantī*). It is celebrated at midday. *Tēla Chaturthī* is another name for *Māgha śukla chaturthī*. It is performed in the evening and is *pūrvaviddha*. *Kuṇḍa Chaturthī* is another name for the same festival.

Bhādrapada śukla chaturthī is special when it falls on Sunday or Tuesday.

Similarly, the bahula chaturthī in every month is *Sankāśhtachaturthī* and is a fast day for people in difficulties: the fast is broken at moonrise which is the time. This chaturthī is called *Angāraka Chaturthī* if it falls on Tuesday and continues till moonrise.

Śrāvaṇa bahula chaturthī is called, par excellence, *Rāhula Chaturthī* and cows are then worshipped.

Panchamī (Tithi V).

Chaitra śukla 5 is *Srī panchamī* according to some: it is also *Kalpāntī* (forenoon).

Śrāvaṇa śukla 5 is *Nāga panchamī* and snakes are then worshipped. If tithi begins within 6 ghaṭikas after sunrise of one day and ends within 6 ghaṭikas after sunrise on the next day, the tithi is celebrated on the former day and that is *Nāgā panchamī*.

Bhādrapada śukla 5 is *Rishī panchamī* (midday).

Āśvina śukla 5 is *Lalitā panchamī* or *Upānga-lalitā-vrāta*, when Durgā is worshipped in the afternoon.

Mārgaśīrṣa śukla 5 is *Nāgapūjā* or *Nāga panchamī*.

Māgha śukla 5 is *Vasanta panchamī*, when Rati and Kāma are worshipped in forenoon. *Srī panchamī* is another name.

Phālguna bahula 5 is *Ranga panchamī*, when colours are thrown about.

Shushthī (Tithi VI).

Śrāvaṇa śukla 6 is *Kalki-Jayantī* (sunset), the last avatāra of Viṣṇu.

Śrāvaṇa bahula 6 is *Hala Shashthī*.

Bhādrapada śukla 6 is *Sūrya-Shashthī* or *Skanda-Shashthī*.

Bhādrapada bahula 6 is *Chandra Shashthī*. It is called *Kapila-Shashthī* when it combines on Tuesday with Nak. Rohini and Yoga Vyatīpāta and the sun is in Hasta.

Kārttika śukla 6 is special for feeding of Brahmans when it falls on Tuesday.

Mārgaśīrsha śukla 6 is *Skanda-Shashthī* or *Mahā-Shashthī*; *Champā-Shashthī*, when Śiva is worshipped as Khandoba. This tithi is special when it falls on Sunday or Tuesday and combines with Nakshatra Satābhishaj and Yoga Vaidhṛiti, or either of the two.

N.B.—Eye-table s shows that Nak. Satābhishaj (No. 24) may concur with the tithi in a year in which some month before Mārgaśīrsha is 'adhika'; but Yoga Vaidhṛiti (No. 27) can never concur with this tithi Eye-table v.

Saptamī (Tithi VII).

A *saptamī* on Tuesday, combined with Nak. Revatī (that is, by Eye-table, section s, bahula 7 in Āshāḍha or śukla 7 in Pausa or Māgha) is very auspicious. A *śukla saptamī*, falling on Sunday, is called *Vijaya*, and is special for donations. A *śukla saptamī*, joined with the first quarter of Nak. Hasta, is called *Bhadra*. A *śukla saptamī*, coinciding with a Sankrānti, is called *Mahājyā*, which, for making donations, is superior even to an eclipse.

Vaiśākha śukla 7 is *Gangā-Saptamī* or *Gangōtpatti* (birth of Gangā—midday).

Śrāvaṇa bahula 7 is *Sitalā-Saptamī* or *Sitalā-Vrata* time *pūrvaviddha*.

Bhādrapada śukla 7 is called by some *Aparājītā*.

Āsvina śukla 7; about this tithi *Sarasvatī* is worshipped under Nakshatra Mūla.

Kārttika śukla 7 is *Kalpādi* (forenoon).

Mārgaśīrsha śukla 7 is *Sūryavrata*.

Māgha śukla 7 is *Ratha-Saptamī* or *Mahā-Saptamī* (time, *aruṇōdhaya*); *Manvādi* (forenoon).

Ashṭamī (Tithi VIII).

An *Ashṭamī*, falling on Wednesday, is special and receives the name of *Budhāshṭamī*. The *Śukla Ashṭamī* in every month is sacred to Durgā or Annapūrnā; while the *Bahula Ashṭamī* in every month, called *Kālāshṭamī*, celebrated at *pūrvaviddha*, is sacred to Kṛishṇa.

Chaitra śukla 8 is *Bhuvāni-utpatti*: when joined with Wednesday and Nak. Punarvasū; bathing on this tithi is special

Śrāvaṇa bahula 8: *Janmāshṭamī*, *Kṛishṇāshṭamī* or *Kṛishṇa Jayantī* (midnight); special when combined with Nak. Rohini; less so, when joined only to Monday or Wednesday; *Manvādi* (afternoon).

Bhādrapada śukla 8: *Jyeshthā-Gaurī-pūjana-vratā*, when moon is in Nak. Jyeshthā.

Bhādrapada bahula 8; *Mahālakṣmī vrata* (*pūrvaviddhā*); *Ashṭaka-śrāddha*.

Āsvina śukla 8 is *Mahāshṭamī* and is special when joined to Tuesday.

Kārttika śukla 8 is *Gopāshṭamī*, when cows are worshipped.

Kārttika bahula 8 is *Kṛishṇāshṭamī*, *Kāla Bhairavāshṭamī*, or *Kāla-Bhairavajayantī*.

Mārgaśīrsha bahula 8 is *Ashṭaka-śrāddha* in the afternoon. The same is the case with bahula 8 in Pausa, Māgha and Phālguna.

Pausa śukla 8 is special when joined to Wednesday and Nak. Bharanī (Rohini or Ārdra, according to some).

Māgha śukla 8 is *Bhīṣmāshṭamī* and is celebrated at midday.

Māgha bahula 8 is Birth of Sitā.

Navamī (Tithi IX).

Chaitra śukla 9 is *Rāma-navamī* or *Rāma-jayantī*, at midday.

Bhādrapada śukla 9 is *Aḍukkha-navamī*.

Āsvina śukla 9 is *Mahā-navamī* or *Durgā-navamī*; *Manvādi* (forenoon).

Kārttika śukla 9 is *Kṛitayugādi* (forenoon).

Mārgaśīrsha śukla 9 is *Kalpādi* (forenoon).

Māgha bahula 9 is *Rāmādāsa navamī*.

Daśamī (Tithi X).

Chaitra śukla 10 is *Dharmarāja daśamī*.

Jyeshtha śukla 10 is *Daśa-harā* (expiating ten sins) or *Gangāvatāra*.

Āshāḍha śukla 10 is *Manvādi* (forenoon).

Āsvina śukla 10 is *Vijayadasamī* or *Daśara* (afternoon); special with Nak. Śrāvaṇa; *Buddha Jayantī*.

Ekādasi (Tithi XI)—See p. 12 *supra*.

Dvādaśī (Tithi XII).

The *Dvādaśī* is called *Mahā-dvādaśī* in the following circumstances :—

11th Tithi current at sunrise on two successive days : the next *Dvādaśī* is called *Unmilānī*.

12th Do. do. : the *Dvādaśī* is called *Vanjūlī*.

12th Tithi, to be followed by a full moon or a new moon tithi, current at two sunrises—*Pakshavardhinī*.

12th Tithi, joined with Nakshatra *Pushya*, is *Jaya* [i.e., by Eye-table s, Bahula 12 in Bhād. or śukla 12 in Phālg. or Chait.]

Do. do. *Śravana* is *Vijaya* [i.e., by Eye-table s, śukla 12 in Bhād., Asv.; bahula 12 in Phālg.].

Do. do. *Punarvasū* is *Jayanti* [i.e., by Eye-table s, śukla 12 in Phālg.; bahula 12 in Śravana].

Do. do. *Rohini* is *Papanāsinī* [i.e., by Eye-table s, śukla 12 in Pausha, Māgha; bahula 12 in Āshāḍha].

Vaiśākha śukla 12, joined with Nak. *Hastā*, and Jupiter and Mars in *Simha*, Sun in *Mēsha*, is *Vyutīpātā*.

Āshāḍha śukla 12 is the commencement of *Chāturmāsya vrata*.

Śravana śukla 12 is *Vishoh-pavitṛā-rōpanam*.

Bhādrapada śukla 12 is *Vāmuna jayanti* (midday); called *Śravana Dvādaśī*, when joined with Nak. *Śravana*, and specially, when further joined with *Wednesday*.

Āsina bahula 12 is *Gōvatṣa Dvādaśī* (evening).

Kārttika śukla 12 : (1) end of *Chāturmāsya vrata*, which began on same tithi in *Āshāḍha*.

(2) *Prabōdhotsava* or *Uttānu dvādaśī* (preparation for waking Vishṇu).

(3) *Tulasī vivāha* (marriage of Vishṇu with the *Tulasī* plant).

(4) *Manvādī* (forenoon).

Māgha śukla 12 : *Bhīṣma dvādaśī*.

[N.B.—This can only happen when a month previous to *Māgha* is *Adhika*—See Eye-table s.]

Trayōdaśī (Tithi XIII).

Chaitra śukla 13 : *Mādanu trayōdaśī* or *Ananga Pūjana vrata* (pūrvaviddha); God of Love worshipped.

Bhādrapada bahula 13 : (1) *Kahiyugādī* (afternoon).

(2) *Māgha trayōdaśī*, when combined with Nak. *Maghā*.

(3) *Gajachchāyā*, when joined to Nak. *Maghā* and Sun in *Hasta*.

Āsina bahula 13 : *Dhana trayōdaśī*, when money-lenders worship money.

Māgha śukla 13 : *Kalpādī* (forenoon).

Phālguna bahula 13 : (1) *Vāruṇī*, when joined with Nak. *Satabhishaj*.

(2) *Mahāvāruṇī*, when joined with Nak. *Satabhishaj* + *Saturday*:

(3) *Mahā-Mahā-Vāruṇī* when joined with Nak. *Satabhishaj* + *Saturday* + *Yoga Śubha*.

[N.B.—Combinations (1) to (3) can happen only when *Phālguna* or some previous month is *Adhika*—See Eye-table s.]

Chaturdaśī (Tithi XIV).

Bahula *Chaturdaśī* in every month is *Śivarātri*.

Vaiśākha śukla 14 : *Narasimha jayanti* (sunset); special when joined to Nak. *Svāti* + *Saturday*.

Śravana śukla 14 : *Varalakṣmī vrata*.

Bhādrapada śukla 14 : *Ananta chaturdaśī*.

Āsina bahula 14 : *Naraka chaturdaśī* (moonrise), fasting to avoid *naraka* or hell. *Dīpāvalī* (see *Āsina amāvāsyā* below) may fall on this tithi if joined to Nak. *Svāti*.

Kārttika śukla 14 : *Vaīkuntṭha chaturdaśī* (midnight).

Mārgaśīrsha śukla 14 : *Pāshānu chaturdaśī*.

Māgha bahula 14 : *Mahā Śivarātri* (midnight, when Nak. *Śravana* is current). Special, when combined with *Sunday* or *Tuesday* and *Yoga Śiva*.

[N.B.—*Yoga Śiva* can combine with *Śivarātri* only when some month previous to *Māgha* is *Adhika*.—See Eye-table s.]

Sukla Panchadaśī (Tithi XV) : Śukla 15 or Pūrṇimā—Full Moon.

A śukla 15 or Pūrṇimā is called *Somavatī* when it falls on Monday and is special for donations.

It is called *Chūḍāmaṇi* when it is further joined with a lunar eclipse.

Most pūrṇimās receive special names, which are given below :—

Chaitra pūrṇimā :—(1) *Manvādī* (forenoon).

(2) *Hanumat-jayantī*.

(3) Special for bathing, when combined with Sunday, Thursday or Saturday.

Vaiśākha pūrṇimā :—*Kūrma jayantī* (late afternoon).

Jyēṣṭha pūrṇimā :—(1) *Manvādī* (forenoon).

(2) *Vaṭa pūrṇimā* or *Vaṭa Sāvitrī* (pūrvavidhā).

(3) *Mahā-jyāishṭhī*, when Moon and Jupiter are in Nak. *Jyēṣṭhā* and Sun in *Rohiṇī*.

Aśāḍha pūrṇimā :—(1) *Manvādī* (forenoon).

(2) *Śivāyaṇāśṭava*, or *Kokilā-vratā* or *Vyāṣapūjā*.

Śrāvaṇa pūrṇimā :—(1) *Rig-yajur-Śrāvaṇa* (i.e., Śrāvaṇa for followers of Rig and Yajur Vedas).

(2) *Rakṣābandhana* (tying a string round the arm) or *Rukṣipūrṇimā* or *Nāvalī pūrṇimā* (throwing coconuts into the sea).

(3) *Hayagrīva Jayantī*.

Bhādrapada pūrṇimā :—*Praushkṣhapādī pūrṇimā* or *śrāddha*.

Āśvina pūrṇimā :—(1) *Kojāgari pūrṇimā* or *Kojāgara vrata* (midnight) Lakṣmi and Indra worshipped ; games of chance.

(2) *Navāṇna pūrṇimā*, when new grain is cooked.

Kārttika pūrṇimā :—(1) *Manvādī* (forenoon).

(2) *Chāturmāsya vrata* ends.

(3) *Tripurī pūrṇimā* or *tripurātsava*.

(4) Special when joined to Nak. *Kṛttikā*.

(5) *Mahā kṛttikā*, when joined to Nak. *Rohiṇī* ; or when Moon and Jupiter are both Nak. *Kṛttikā*.

(6) *Padmakayoga*, when Moon is in Nak. *Kṛttikā* and Sun in Nak. *Vaiśākha*.

(7) *Kṛttikā* festival in Southern India.

Mārgaśīrsha Pūrṇimā :—(1) *Dattātreya* or *Datta-jayantī* (evening).

(2) Special for donations of salt, when joined to Nak. *Mṛgaśīrā*.

(3) *Ārdra* festival in honour of Śiva at Chidambaram and elsewhere. Śiva, in his incarnation of Natesa, is said to have been born on Mārgaśīrsha Pūrṇimā under the Nakṣatra *Ārdra*. the combination could take place only when some month previous to Mārgaśīrsha was *adhika*. (See Eye-table s.)

Māgha Pūrṇimā Maha-Maghi, when Moon and Jupiter are both in Nak. *Maghā*.

Phālguna pūrṇimā :—(1) *Manvādī* (forenoon).

(2) *Holkā* or *Hutāsani pūrṇimā* (evening).

(3) *Kāman Paṇḍigai* (in South India destruction of the Indian Cupid by Śiva).

Bahula Panchadaśī (Tithi XV) : Amāvāsyā—New Moon.

A solar eclipse on Sunday is *Chūḍāmaṇi*, and is special for donations.

Amāvāsyā at the end of Śrāvaṇa and beginning of Bhādrapada : *Pithorī* or *Kuṣṇapāṇī*.

Amāvāsyā at the end of Bhādrapada and beginning of Āśvina : *Sarvapitrī* or *Mahālaya Amāvāsyā* ; special when Sun and Moon are both in Nak. *Hasta*.

Amāvāsyā at the end of Āśvina and beginning of Kārttika is *Dīpāvalī*, with previous and following tithis ; that on which Nak. is *Śvātī* being the special day.

Amāvāsyā at the end of Pausa and beginning of Māgha (1) *Ardhodaya*, when joined with *Sunday* in day time + Nak. *Śrāvaṇa* + *Yoga Vyatīpāta*.

[N.B.—This can only happen when some month previous to Māgha is *Adhika*.]

Amāvāsyā at the end of Pausa and beginning of Māgha (2) *Mahodaya* when any one of these special features is wanting.

Amāvāsyā at the end of Māgha, and beginning of Phālguna : (1) *Dvāparayugādī* (afternoon). (2) Special for *Śrāddhas*, when joined with Nak. *Satābhishaj* or Nak. *Dhanishṭha*.

Amāvāsyā at the end of Phālguna and beginning of Chaitra : *Manvādī* (afternoon)

CHAPTER IV.

SECTION XX.—THE MUHAMMADAN CALENDER.

51. The Muhammadan era, commonly called *Hejrā* or *Hijra*, is dated from Friday, 16th July, A.D. 622, the day of the flight of the Prophet.

The Muhammadan calendar is not luni-solar like the Indian calendar, but strictly lunar. The length of the synodical month according to the Muhammadan calendar is 29 days 12 hours 44 minutes. The three seconds reckoned in addition in the Hindu calendar are neglected in the Muhammadan. The months are alternately 29 and 30 days long, which, again, if carried out uniformly, would result in an error of 44 minutes per month, which, in 360 months or 30 lunar years, would amount to $\frac{360 \times 44}{60 \times 24} = 11$ days. These 11 days are accordingly added to the last month of the calendar in 11 out of every 30 years, and the year containing an extra day, is from analogy, sometimes called a leap year.

52. Every 30 years form a cycle in the Muhammadan calendar. The years which have 355 days, instead of 354, are in some countries the 2nd, 5th, 7th, 10th, 13th, 15th, 18th, 21st, 24th, 26th and 29th. Elsewhere, the 2nd, 5th, 8th, 10th, 13th, 15th, 19th, 21st, 24th, 27th and 29th are kept as leap years.

It will be noticed that the difference of usage is as regards the 8th, 19th and 27th years in each cycle. The generality of authorities (including the *Encyclopædia Britannica*) have adopted the 7th, 18th and 28th years of each cycle as leap years and the *Ephemeris* follows this usage.

53. All the books that deal with the Muhammadan calendar mention the above difference of usage, but they do not give the reason of it. The reason is, however, not far to seek.

If we write down the accumulated error which remains at the end of each year by reason of the neglect to take account of 44 minutes and which was adverted to in the first section of this chapter, we obtain the following result under the system of reckoning the 8th, 19th and 27th as leap years:—

Year.	Error.	How error is corrected by leap year.	Year.	Error.	How error is corrected by leap year.
1st year,	8 hrs. 48'		16th year,	20 hrs. 48'	6th day added by leap year.
2nd year,	17 hrs. 36'	1st day added by leap year.	17th year,	5 hrs. 36'	
3rd year,	2 hrs. 24'		18th year,	14 hrs. 24'	
4th year,	11 hrs. 12'		19th year,	23 hrs. 12'	7th day added by leap year.
5th year,	20 hrs. 0'	2nd day added by leap year.	20th year,	8 hrs. 0'	
6th year,	4 hrs. 48'		21st year,	16 hrs. 48'	8th day added by leap year.
7th year,	13 hrs. 36'		22nd year,	1 hr. 36'	
8th year,	23 hrs. 24'	3rd day added by leap year.	23rd year,	10 hrs. 24'	
9th year,	7 hrs. 12'		24th year,	19 hrs. 12'	9th day added by leap year.
10th year,	16 hrs. 0'	4th day added by leap year.	25th year,	4 hrs. 0'	
11th year,	0 hrs. 48'		26th year,	12 hrs. 48'	
12th year,	9 hrs. 36'		27th year,	21 hrs. 36'	10th day added by leap year.
13th year,	18 hrs. 24'	5th day added by leap year.	28th year,	6 hrs. 24'	
14th year,	3 hrs. 12'		29th year,	15 hrs. 12'	11th day added by leap year.
15th year,	12 hrs. 0'		30th year,	<i>Nil.</i>	

Those who observe the 8th, 19th and 27th years as leap years add a day by means of a leap year in order to avoid the error accumulating to more than 1 *day* at the end of the following year; while those that observe the 7th, 18th and 26th as leap years add a day by means of a leap year in order to avoid the error accumulating to more than *half a day* at the end of the following year.

54. The months and the number of days in each are as follows:—

Month.	Number of days.	Day of commencement reckoning from beginning of year.	Month.	Number of days.	Day of commencement reckoning from beginning of year.
1. Muharram	30	..	7. Rajab	30	177
2. Safar	29	30	8. Sha'bān	29	207
3. Rabi-ul-awwal	30	59	9. Ramazān	30	236
4. Rabi-ul-akhir or Rabi-us-sani	29	89	10. Shawwāl	29	266
5. Jamāda'l-awwal	30	118	11. Zi-l-ka'da	30	295
6. Jamāda'l-akhir or Jumad-us-sani	29	148	12. Zi-l-hijja	29	325
			Do (when intercalary) ..	30	

All readers are familiar with the names of two of the Muhammadan months, *Muharram* and *Ramuzān*, and all are equally familiar with the fact (due to the strictly lunar character of the year) that *Muharram* is liable to occur at any part of the solar year.

55. The Muhammadan day, like the Jewish, is reckoned from sunset to sunset, and the first day of *Muharram* is that on which the moon is for the first time visible at sunset after new moon. This is called the heliacal rising of the moon. Our readers are familiar with the Muhammadan usage of observing the heliacal rising of the moon from eminences of any sort, and passing word as soon as she is seen, so as to give notice that *Muharram* has commenced.

To the reader who is by this time quite at home among tithis and their ending moments, we would quote the following rule from Messrs. SEWELL & DIKSHIT's *Indian Calendar* :—

“It is well to note that where the first tithi of a month ends not less than 5 ghaṭikas before sunset, the heliacal rising of the moon will probably take place on the same evening; but where the first tithi ends 5 ghaṭikas or more after sunset, the heliacal rising will probably not take place till the following evening. When the first tithi ends within these two periods between 5 ghaṭikas before and 5 ghaṭikas after sunset, the day of the heliacal rising can only be ascertained by elaborate calculations.”

Where so much depends upon sunset and moonrise, it is obvious that places with different longitudes and latitudes will often not agree in regard to the exact date of commencement of the Muhammadan year.

PART II.

CHAPTER V.

THE HOROSCOPE.

56. The simplest form of the horoscope and the one most generally used in Southern India is the following. The particular horoscope entered in the form is supposed to be drawn up for a child born at 2 a.m. on Wednesday (i.e., the night between Tuesday and Wednesday), 1st April A.D. 1925. The manner of determining the lagna is explained in the specimen problem on *lagna*, pp. 94, 95. It will there be shown that the time in question is very nearly the 353rd completed

Mina <i>Sun</i> , 348° <i>Venus</i> , 342°	Mēsha <i>Mercury</i> , 3°	Rishabha <i>Mars</i> , 42°	Mithuna <i>Moon</i> , 73°
Kumbha			Karkāṭaka <i>Rāhu</i> , 108°
Makara <i>Lagna</i> , 285° <i>Ketu</i> , 288°			Simha
Dhanus <i>Jupiter</i> , 267°	Vṛiśchika	Tula <i>Saturn</i> , 200°	Kanya

day of the Indian solar year A.D. 1924–25. The sun's longitude for the 353rd completed day is by Table P.A. (p. 47) $345.78^\circ + 2.17^\circ = 347.95^\circ$. The sun is therefore entered in the horoscope at the top left hand corner which is always allotted to *Mina* rāśi (Pisces, 330° to 359° . See Eye-table sec. z, p. 35). The other rāśis are entered in the succeeding compartments beginning with *Mēsha* and ending with *Mina*. The moon's longitude which is determined by the short method indicated in paragraph 35, page 7, is 73° : we therefore enter it in the appropriate rāśi. For the planets Mars, Mercury, Jupiter, Venus and Saturn we refer to Table P.G. year 1924–25, 353rd day (pp. 74, 75) and taking out the quantities in that table for the 350th and 360th complete days we arrive at the quantities for the intervening 353rd day as follows :—

		p. 75 350 days Degrees.	p. 75 360 days. Degrees.	Movement in 10 days. Degrees.	Movement in 1 day. Degrees.	Movement in 3 days. Degrees.	Geo. pl. on 353rd complete day. Degrees.
Mars	..	40.3	46.6	6.3	63	1.89 or 1.9	42.2
Mercury	..	0.5	9.8	9.3	93	2.79 or 2.8	3.3
Jupiter	..	266.6	267.9	1.3	13	.39 or .4	267.0
Venus	..	338.1	350.5	12.4	1.24	3.72 or 3.7	541.8
Saturn	..	200.3	199.8	— .5	— .05	— .15 or — .1	200.2

The positions determined in the last column are then duly entered in the respective *rāsis*. The position of *Rāhu* for 353rd completed day in A.D. 1924-25 is as follows (Table P.B. pp. 48, 51):—

(p. 48) A.D. 1900, commencement	..	..	231°01'
(p. 51)	24 yrs.	104°6'	
	350 days	18°5'	
	3 days	2°	
	123°3	— 123° 3'	
		107° 7'	

Rāhu's place 107°7' or 108° is entered in Karkāṭaka *rāsi* and *Ketu*'s place will therefore be 288° in Makara which is the lagna.

For filling up horoscopes not comprised between A.D. 1839 and A.D. 1999 we have to calculate first of all the mean longitudes and then determine the actual places from the respective planetary Eye-tables as shown in the specimen problem.

Calculation of planets' mean and geocentric places.

57. Indian astronomy reckons nine planets, spoken of collectively as *navagrahas*, namely, the Sun, Moon, Mars, Mercury, Jupiter, Venus, Saturn, *Rāhu* and *Kētu*. It will be seen that the first seven are named in the order of the days of the week, and this is nearly always the order in which they are referred to in Indian astronomy, showing that planetary week-days and planets' names came into India at the same epoch. *Rāhu* is another name for the moon's ascending node, one of the points at which the moon's orbit cuts that of the sun (the ecliptic), the other point, or the descending node, being called *Kētu*. An eclipse cannot happen except when the moon is at either node and the sun is at the same or the opposite node; hence the popular legend which depicts *Rāhu* as a dragon swallowing up the moon or the sun at the time of an eclipse. All the planets, except *Rāhu* and *Kētu*, move, like the sun, from west to east in their apparent path round the earth. *Rāhu* moves in the opposite direction, and *Kētu* is always assigned a position 180° from that of *Rāhu*. For *Rāhu* see Table P.B.

58. The longitude of any planet is its distance, measured in degrees, from an arbitrary point in the ecliptic, which point may perhaps best be defined as the 0 point of the sun's mean longitude. The sun's mean longitude is always 0 at a certain part of the Indian solar year, namely, at 2·1707 days from the commencement of each Indian solar (according to the *Sūrya siddhānta*), while at the moment of commencement of the Indian solar year, the sun's actual longitude is 0. The difference between the sun's mean and actual longitude at any time is his equation of the centre, and this difference is due to his varying pace at different times of the year as he journeys round the earth. The sun's mean longitude and equation for every complete day of the solar year are given in Table P.A. (p. 47) and these are most important data in Indian astronomy.

59. The sun's mean longitude at any moment is ascertained (in *Sūrya siddhānta*) by taking, as in problem III (v) on p. 95 *post*, the number of days and fraction of day elapsed since the commencement of the Indian solar year, and applying to the result the table of sun's longitudes (Table P.A.). The difference between the sun's longitude thus calculated and the mean longitude of the sun for the same moment given in any European *Nautical Almanac*, is the true Indian precession, and this difference should always be added to the longitude of a planet given in this work for years subsequent to A.D. 532 in order to arrive at the corresponding longitude according to the *Nautical Almanac*. The following table gives the precession to be added to Indian celestial longitudes at various epochs since A.D. 532 (when the European and Indian longitudes coincided), in order to arrive at the European celestial longitude. The initial rate of precession adopted for this table is 0·16322 of a degree per annum or 1·63 degrees for every 100 years. The exact method by which the precessional quantities tabled below have been arrived at will be found fully explained in the paper on precession appended to this work.

(The European longitude of a planet is called its *tropical* longitude from its being regulated in the same way as the tropical year, whereas the Indian longitude is generally called a *sidereal* longitude from its being regulated in the same way as the sidereal year—see paragraph 6 *supra*.)

A.D.	Kaliyuga.	Indian precession in degrees.	A.D.	Kaliyuga.	Indian precession in degrees.	A.D.	Kaliyuga.	Indian precession in degrees.
532	3633	0·0	1062	4163	8·6	1600	4701	17·3
562	3663	0·5	1100	4201	9·2	1632	4733	17·9
592	3693	1·0	1132	4233	9·7	1662	4763	18·4
622	3733	1·6	1162	4263	10·2	1700	4801	19·0
662	3763	2·5	1200	4301	11·8	1732	4833	19·5
700	3801	3·0	1232	4333	11·4	1762	4863	20·0
732	3832	3·2	1262	4363	11·9	1800	4901	20·6
762	3862	3·7	1300	4401	12·5	1832	4933	21·2
800	3901	4·3	1332	4433	13·0	1862	4963	21·7
832	3933	4·9	1362	4463	13·5	1900	5001	22·2
862	3963	5·4	1400	4501	14·1	1932	5033	22·8
900	4001	6·0	1432	4533	14·6	1962	5063	23·3
932	4033	6·5	1462	4563	15·1	2000	5101	23·9
962	4063	7·0	1500	4601	16·7	2032	5133	24·4
1000	4101	7·6	1532	4633	16·3			
1032	4133	8·1	1562	4663	16·8			

60. The moon's mean and actual longitude are determined either direct from the nakshatra using the scheme of nakshatras and other initial longitudes as on p. 3 or by the short method indicated in paragraph 35, p. 7 *supra*.

61. The mean sidereal periods of planets other than the sun and the moon, as used in this work, are those of modern European astronomy, adjusted, as explained below, to the Indian sidereal year. The following table compares the sidereal period of each planet, by Sūrya siddhānta without *bīja*, with that adopted in this work as well as with the results of modern astronomy. A full explanation of the difference between columns 3 and 4 is furnished in paragraphs 64 to 67 below:—

Planet.	Sūrya siddhānta without <i>bīja</i> .	Modern astronomy (Encycl. Brit.).	Figure adopted in this work.
Col. 1.	Col. 2.	Col. 3.	Col. 4.
	DAYS.	DAYS.	DAYS.
Mars	686·99749	686·979702	686·98818
Mercury	87·969702	87·969256	87·96939
Jupiter	4332·3206	4332·58479	4332·92495
Venus	224·698568	224·700798	224·70170
Saturn	10765·7730	10769·2010	10761·2795

62. In the first place it was thought unnecessary to observe in regard to planetary sidereal periods the same scrupulous adherence to Indian authorities which is incumbent in the case of the solar year and the synodical month. In the next place, the difference between Indian and modern astronomy in the length of the sidereal year results in a slight displacement of the starting point of Indian celestial longitudes, which displacement amounts to 7' 4·96" in 50 years and should be added to the precession,* amounting at the present epoch, according to modern astronomy, to 41' 52·27" for fifty years. The total difference between Indian sidereal and modern tropical longitudes is thus 48' 57·23" for 50 years or 59" per annum, while Bhāskara's estimate of the precession, 59·9007" per annum, is only slightly larger.

63. If the slight annual displacement of the zero point of Indian longitudes, which is a practical postulate of Indian astronomy, however unrecognized in theory, is applied to the sidereal places of planets, their mean sidereal periods will have to be altered as shown in column 4 of paragraph 61 above. In this manner alone will it be possible to apply to the planets the same precession as is applied to the sun, for the purpose of converting sidereal into tropical longitude.

N.B.—By taking this slight liberty with the mean sidereal periods of planets, the exact agreement of the mean place of any planet with its place in modern astronomy is secured, and the serious divergences between the two systems, commented on in Whitney's notes on the *Sūrya siddhānta*, have been effectually avoided. As a result, the place, whether mean or actual, assigned to any planet in Table P.B. may not tally exactly with Indian calculations, unless the corrections indicated in Table P.B. III below are made; but the difference will generally be found to be very slight, while there is an obvious advantage in having for every possible epoch a mean place for each planet, identical with that assigned to it by modern astronomy.

64. The reader may be desirous of being furnished with a somewhat fuller explanation of the expression "the slight annual displacement of the zero point of Indian longitudes." In the *Encyclopædia Britannica*, 11th edition, Volume 1, page 492, lengths of the sidereal year in Indian and in modern European astronomy are compared as follows:—

Sūrya siddhānta	365 d. 6 hrs. 12 min. 36·56"
Modern astronomy	365 d. 6 hrs. 9 min. 9·60"

The difference between the two lengths of the sidereal year is ·00239537 of a day. When the sun has completed a sidereal year according to modern astronomy, he is still assumed in the Sūrya siddhānta to continue to move on for ·00239537 of a day before completing his sidereal orbit: and during this space of time he describes, by the same authority, $·98560264 \times ·00239537 = ·002360883$ of a degree. In consequence, the 0° point of Indian celestial longitude, which in theory is supposed to be absolutely fixed in the heavens, is actually shifted every year, so far as the sun is concerned, by ·002361 of a degree. For 1400 years this shift amounts to 3·3054 or a little less than 3½ degrees. If, according to the general opinion of historians of Indian astronomy, the sun was at the 0 point of longitude and in *Zēta Piscium* on or about 18th March A.D. 532, his present 0 point in A.D. 1920 is, according to Indian astronomy, 3½ degrees to the east of *Zēta Piscium*.

65. The practical consequence of this shift is that a planet which was with the sun in *Zēta Piscium* and in 0° longitude on 18 March A.D. 520, and which during the last 1,400 years has, by modern astronomy, completed a certain integral number of revolutions, must in A.D. 1920, *i.e.*, at the end of exactly 1,400 years and exactly at the end of the last of those revolutions, be *ex hypothesi* with the sun again in *Zēta Piscium*; but in Indian astronomy such a planet would still be 3½ degrees short of a conjunction with the sun, because the sun's 0° point of longitude had in the interval of 1400 years moved 3½ degrees away to the east of *Zēta Piscium*. Now the 0° of longitude must in any system of astronomy be the same for the sun as for the planets, as otherwise we would be in hopeless confusion in investigating their relative positions; and therefore it is inevitable that any conventional lengthening of the sun's course in order to reach his 0 point of longitude should entail a proportionate lengthening of the sidereal course of each planet. We shall now proceed to study the exact amounts by which the sidereal periods of the different planets have to be lengthened.

* An investigation of the precessional correction, necessary to convert Indian sidereal into European tropical longitudes, will be found in the second paper in the appendix to *Indian Ephemeris*, Vol. I, Part i: "Luni-solar precession as applied to Indian astronomy."

66. *Mars*.—The period of Mars' revolution is 1·88082 sidereal y ars (modern) and to keep up with the Indian sun, Mars' revolution must be carried forward by $1·88082 \times '002361 = '00441$ degree, before Mars can be said to have returned to 0° longitude. Now Mars' motion (modern astronomy) being 1·9083 days per degree, the lengthening of the sidereal period of revolution in his case is $1·9083 \times '00441$

			= '0084748 day.
Add Mars' modern sidereal period	..	..	686·979702 days.
Total sidereal period for Mars, required by Indian astronomy.			<u>686·988177 days</u>

That is, if we fix the sidereal period of Mars at the figure last arrived at, we shall, it is true, not arrive at his true mean sidereal longitude for any given year, particularly for remote years, but the correction to be made in order to get either his true mean sidereal longitude or his true tropical longitude will be the same as in the case of the sun. For the remaining planets, the working is given below without the explanation which is the same as in the case of Mars.

Mercury.—Rate : '2441 day per degree ; '2408 year for one sidereal revolution (mod. astron.)

'2408 × '002361 × '2441 day =	..	..	'000139 day.
Add Mercury's sidereal period (modern)	..	..	87·969256 (mod. astr.)
Total required by Indian astronomy	..	..	<u>87·969395 days.</u>

Jupiter.—Rate : 12·035 days per degree : 11·8618 years for 1 sidereal revolution (mod. astron.).

11·8618 × '002361 × 12·035 day	..	..	0·33705 day.
Add Jupiter's sidereal period (modern)	..	..	<u>4332·5879</u>
Total required by Indian astronomy	..	..	<u>4332·92495 days.</u>

Venus.—Rate : '6242 day per degree ; '6151 year for one sidereal revolution.

'6151 × '002361 × '6242 day =	..	..	0·0009065 day.
Add Venus' sidereal period (modern)	..	..	<u>224·700798 (mod. astr.).</u>
Total required by Indian astronomy	..	..	<u>224·701704 days.</u>

Saturn.—Rate : 29·8864 days per degree ; 29·46 years for one sidereal revolution.

29·8864 × 29·46 × '002361 days =	..	..	2·07855 days.
Add Saturn's sidereal period (modern)	..	..	<u>10759·2010 (mod. astr.).</u>
Total required by Indian astronomy	..	..	<u>10761·2795 days.</u>

67. It will strike the reader that the result of adopting periods of revolution differing from those recognized in Indian astronomy must be that in a long period of time there would be a considerable divergence between the mean longitude of a planet arrived at with the aid of the *Ephemeris* and that, for instance, implied in an ancient Indian record. To guard against such divergences, it is necessary to tabulate them from epoch to epoch, so that in a given case we may know what to expect in an Indian record. This is a precaution which should certainly not be neglected by an investigator and it will be found from the small table III on p. 48 *infra* that the necessity for such a correction has been foreseen, and the table is made good use of in the investigation of Rama's horoscope, of which the final result is set out on p. 96 below.

68. After settling the sidereal periods of revolution of the several planets, which are necessary to bring Indian astronomy into line with modern results, we have next to settle the exact quantity by which the mean longitude of each planet is increased every year. The best method of ascertaining the annual motion of a planet is to take a long synodic period, the longer the better, that is, a period after which the sun and the planet in question come very nearly together. An example will illustrate what is meant.

69. Mars' period for 193 revolns. = $193 \times 686·9882$ days	=	132588·7226 days.
363 Indian solar sidereal years = $363 \times 365·258756$ days	=	132588·9286 days.
363 years =	193 revolutions of Mars +	2060 day.
Mars' movement in 2060 day = $206 \times '524 = '107944$ degree	and 193 revolutions = $193 \times 360 = 69480$ degrees.	
∴ In 363 Indian solar years, or 193 Mars' revolutions + 2060 day, Mars' movement is 69480·107944 degrees.		
∴ In one Indian sidereal year Mars' movement = $\frac{69480·107944}{363} = 191·405253$ degrees.		

Mercury: 1,474 revolutions of Mercury = 1474×87.96939 .. = 129666.88086 days.
 355 Indian sidereal years = $355 \times 365.2557.6$ = 129666.8585 days.

$\therefore$ 355 Indian solar years = 1,474 revolutions of Mercury — .02236 day.

Mercury's movement for .02236 day = $.02236 \times 4.09233^\circ$ = .0915045° degree.

Since 355 Indian solar years = 1,474 Mercury's revolutions — .0915045° = 530639.9084955 degrees,

$\therefore$ In one Indian sidereal year Mercury's movement = $530639.9084955^\circ \div 355 = 1494.4030562^\circ$, which (casting out multiples of 360° .) is the same as 54.76030562° .

Jupiter: 131 revolutions of Jupiter = 131×4332.92495 days = 567613.175 days.

1554 Indian sidereal years = 567612.108 days.

$\therefore$ 1554 Indian solar years = 131 revolutions of Jupiter — 1.067 days.

$\therefore$ Jupiter's movement for 1.067 day = $1.067 \times .083087^\circ$ = .088653729 degree.

$\therefore$ 1,554 years = $(131 \times 360^\circ) - .088653729^\circ = 47159.911346271$ degrees.

Jupiter's movement in 1 Indian solar year = the last figure $\div 1554 = 30.3474333^\circ$.

Venus: 1,541 revolutions of Venus = 346265.325864 days (= 1541×224.701704).

948 Indian sidereal years = 346265.3011 days.

$\therefore$ 948 years = 1541, revolutions of Venus — .0247 day.

$-(1541 \times 360^\circ) - (.0247 \times 1.602 \text{ degrees}) = 554760^\circ - .0395694^\circ = 554759.960431^\circ$.

$\therefore$ Venus' movement in one Indian solar year = the last figure $\div 948 = 225.189831^\circ$.

Saturn: 13 revolutions of Saturn = 13×10761.2795 = 139896.6335 days.

383 Indian sidereal years = 383×365.258756484 = 139894.103 days.

$\therefore$ 383 Indian solar years = 13 revolutions of Saturn — 2.530 days

= $(13 \times 360^\circ) - (2.530 \times .03346^\circ) = 4680^\circ - .0846538^\circ = 4679.915346^\circ$.

The last figure divided by 383 gives Saturn's yearly movement for one Indian solar year, viz., 12.2191001 degrees.

70. From the yearly motions of the planets, fixed as above, are obtained (1) the daily motions used in calculating the increase of mean longitude of each planet for odd days of the year (Table P.B.); (2) the motions of planets for odd years of a century (Table P.B.), (3) the cyclic variations for different cycles (Table P.C.) and (4) the Planetary Decursus, Table P.D., pp. 53, 54.

The relation between mean and actual planetary places.

71. We are now in a position to determine the mean longitude (M.L.) of a planet for any moment past or future. This mean longitude which may be found from the different parts of Table P.B. as shown in the specimen problems at the end of the book, has next to be converted into the actual place which is called the geocentric place (G.P.) because it is the place among the constellations in which we on earth expect to find it. The conversion is a troublesome piece of work, whether in European or in Indian astronomy. Indian astronomers, since the time of VAVILALA KUCHINNA (13th cent. A.D.), have used a simplified method of conversion, first introduced by him and made available to English readers by WARREN in his *Kala Sankalita* (MADRAS 1837). Further simplifications for practical work were devised by the present writer in his *Indian Chronology* (1911); but the simplest method of all is that of the planetary eye-tables (pp. 55—59) included and fully illustrated in the present work. The rationale of the method is explained at pp. 132 to 134 of the author's *Ephemeris*, Vol. I, pt. i. The planetary eye-tables enable us to determine by mere inspection the actual, from the mean, place of a planet at any moment and for all practical purposes more especially in chronological investigations, the eye-tables give as good results as those yielded by actual calculation. The eye-tables are used in all the specimen problems worked out at the end of the book (pp. 95—108) and it is therefore unnecessary to give here any examples for the purpose of showing how they should be used.

CHAPTER VI.

ECLIPSES AND ECLIPSE CHRONOLOGY.

72. All over the world, and whatever system of chronology may be followed in any particular country, a recorded eclipse is an unerring landmark for the chronologist, and therefore the energy of mathematicians since the 16th century A.D. has been expended on the production of lists of eclipses for ancient as well as modern times. In such lists the path of each solar eclipse is often noted, showing in what parts of the terrestrial globe it was central and where it was visible. Oppolzer's *Kanon der Finsternisse*, which is generally regarded as a standard work on the subject, describes the eclipses, both lunar and solar, from 1207 B.C. to A.D. 2161 and is fully illustrated with charts. For eclipses comprised within this period, no other guide is necessary, and it happens that the most ancient eclipses recorded anywhere in history fall within this period. Professor Newcomb's *Tables of Solar Eclipses from 700 B.C. to A.D. 2300*, and Dr. Gratton Guinness' very accurate list of lunar eclipses in his *New Moons and Vernal Equinoxes (B.C. 1622 to A.D. 1934)* may also be referred to. Lastly, frequent reference is made in the course of the larger work to a French work, first published in the 18th century, *L'Art de Vérifier les dates*, which gives all kinds of eclipses in some detail from A.D. 1 to A.D. 2000. The eclipses in Sir A. Cunningham's *Book of Indian Eras* are reproduced from the French work. Italicized Solar eclipses in Table IV-L, pp. 338 to 355 of the author's *Ephemeris*, Vol. I, Pt. i, will generally be found in Oppolzer, but not in the French work. The reason why such eclipses are omitted in the French work is given in paragraph 345 of the larger work.

73. But in India public curiosity occasionally fastens itself on eclipses more ancient than any recorded in the above works, which there is no known means of dating, because the literary documents referring to them are themselves destitute of any historical dates. For instance, a solar eclipse is believed to have occurred on the day when Rāma was to have been crowned, and when, instead of being crowned, he went into exile. Bentley referred this eclipse to 940 B.C., July 2. In the Mahābhārata two eclipses, occurring in the course of a fortnight (this is the most sensible construction that can be placed on a passage which literally means that both a lunar and a solar eclipse occurred on the same day, which is physically impossible), are said to have preceded the great battle, and these eclipses must have occurred, according to the commentators, in the lunar month of Kārttika or Mārgaśīrṣa. But there are no dates in either the Rāmāyaṇa or the Mahābhārata, and as there is nothing whereon we can base even an approximation to a date, critics and investigators imagine dates, more or less hypothetical, for the events of the Rāmāyaṇa or for those of the Mahābhārata and seek to establish their hypothesis by showing that there were eclipses on those dates.

74. A recorded eclipse is a genuine and solid landmark in history; but ancient records of eclipses, equally with those of other events, are often not quite exact in detail, and then it is necessary to ascertain by other means whether there was an eclipse on a particular date and what was its nature and extent. An eclipse obeys certain laws of cyclic recurrence, like a tithi or a nakṣatra or a planet: and it is the object of this section to define and exemplify the cycles which will be found most useful in practical investigation, and which will enable us to satisfy ourselves whether an eclipse which is believed to have occurred on a certain date did occur, or could have occurred at that time.

75. An eclipse cycle may be defined as a period, composed of a certain number of partial or complete solar years, after which the sun's distance from a node is the same at new moon (in the case of a solar eclipse), or at full moon (in the case of a lunar eclipse), and the sun's and moon's anomalies are also nearly the same, as at the beginning of the period. A perfect eclipse cycle in this sense probably does not exist, but there is no harm in using an imperfect cycle, provided we apply from time to time the correction, which we may call the cyclic variation.

76. It is stated at n. 104 that in order that an eclipse may be possible, the sun should be within a certain distance from either of the moon's nodes. For a solar eclipse, it suffices if the sun is between 0° and 16.2° from node: indeed a solar eclipse is possible so long as the sun is not more than 18.4° from a node. For lunar eclipses, the limits are much narrower: for a lunar eclipse to be fairly certain, the sun must not be more than 10.44° from a node, and when his distance from a node is between 10.44° and 13.86° , a lunar eclipse is possible, not probable.

77. It follows from the tables of Rāhu's and Sun's motions, that the distance of the sun from the node diminishes every day at the rate of 1.0386015 degree, and the interval from the moment when the mean sun is at a node to the moment when he is at the same node again is $\frac{360^\circ}{1.0386015} = 346.61996$ days. This is the period of a joint revolution of the sun and node, fixed by modern astronomy; but when using this period in Indian astronomy, we have to make an allowance for the annual displacement of the 0° point of longitude in Indian astronomy. Applying the same method to the distance of the sun from the node, or as it is shortly called, "Sun from node," we proceed as follows. —

Sun and node together do $\frac{360^\circ}{346.61996} = 1.0386015$ degrees per day (modern astronomy).

Sun alone does $\frac{360^\circ}{365.25636} = .9856091212$ degree per sidereal day (modern).

$\therefore$ node alone does $1.0386015 - .9856091 = .0529924$ degree per day (modern).

And a given node does 360° in $\frac{360^\circ}{.0529924} = 3793.4269$ days = 18.59906 sidereal years (modern).

In 18.59906 years, the displacement of sun's 0° longitude (*vide* paragraph 217, page 90, *supra*) = $18.59906 \times .002361^\circ = .04391238^\circ$.

But the node travels $.0529924$ degree per day in a direction opposite to that of the sun.

$\therefore$ it travels $.0439124^\circ$ in $\frac{.0439124}{.0529924} = .8286463$ day.

$\therefore$ node, by Indian astronomy, must be held to complete an orbit in $3793.4269 - .8286 = 3792.5983$ days.

$\therefore$ node, by Indian astronomy, travels in one day $\frac{360}{3792.5983} = .0529988^\circ$.

But the sun, by Indian astronomy (Sūrya Siddhānta), in one day travels $.9856026^\circ$.

$\therefore$ sun and node, by Indian astronomy, together travel in one day 1.0386014° .

And sun and node travel in 1 year $1.0386014 \times 365.25876 = 379.3583^\circ$.

$\therefore$ Sun and node together travel 360° in $\frac{360^\circ}{1.0386014} = 346.61998337$ days.

According to Sūrya Siddhānta, the last figure, as observed by Professor Jacobi in *Epig. Ind.*, Vol. I, page 442, ought to be 346.6246334 days: but inasmuch as the only use ordinarily made of the distance of sun from node in chronological investigations is in connexion with eclipses, and eclipses are peculiarly a matter of observation and therefore a matter which, to be safe, should, as far as possible, be regulated by the quantities of modern astronomy, we adopt, for the period of joint revolution of the sun and node, 346.61998337 days which, as compared with the figure adopted in modern astronomy, involves a slight correction for the annual displacement of the sun's 0° longitude in Indian astronomy.

78. The other quantities follow from those above settled. The length of a tithi, as a fraction of a day, by Sūrya siddhānta = $\frac{29 \cdot 530587916}{30} = .9843529315$ of a day.

The joint motion of sun and node for one tithi = $.9843529315 \times 1.0386014 = 1.02235033275$ degrees.

∴ The joint motion of sun and node for 360 tithis, or an ordinary lunar year of 12 months = $360 \times 1.02235033275 = (36) 8.604611979$ degrees; and the joint motion of sun and node for 390 tithis or 13 lunar months (when the lunar year includes an adhika month) = $3(9) 8.716521961^\circ$.

N.B.—Tables for readily calculating the distance of sun from node for any number of days or years will be found at the end of this section.

79. We now proceed to define the principal cycles which are of use in investigating the recurrence of eclipses. The first is the famous saros of 18 years and 10 days, which has been known at any rate in the west since a period of remote antiquity.

- (1) (a) 18 Indian sidereal years = 6,574.65768 days (Sūrya siddhānta).
- (b) 223 synodical months = 6,585.321124 days (Sūrya siddhānta).
- (c) 19 joint revolutions of sun and node = 6.585.779684 days (Ephemeris).

Difference between (a) and (b) = 10.66344 days.

Difference between (b) and (c) = $-.45856$ of a day, or, at the rate the daily joint motion of the sun and node already arrived at, $+.4762^\circ$. In other words, in 18 Indian sidereal years + 10.66344 days, the distance of the sun from node advances by $+.4762^\circ$. The reader should reason out for himself why the result is $+.4762^\circ$ and not $-.4762^\circ$.

- (2) (a) 19 sidereal years (Indian) = 6,935.916364 days.
- (b) 235 synodical months (Sūrya siddhānta) = 6,939.6881565 days.
- This is the Metonic cycle, which is as ancient and as interesting as the saros.
- (c) 20 joint revolutions of sun and node (Ephemeris) = 6,932.3996674 days.

In 235 synodical months (Sūrya siddhānta), difference between (b) and (c) = 7.2884891 days.

In this interval the distance of the sun from the node decreases by $7.2884891 \times 1.0386014 = 7.5698349831^\circ$.

The Metonic cycle can be applied to eclipses when the sun is very near a node at one of the eclipses compared. For example, on the 87th day of A.D. 1 the distance of the sun from node was 3.41° . Nineteen years later, the distance must have decreased by 7.57° , i.e., the distance then was -4.16° , at which distance an eclipse was still more probable.

- (3) (a) 358 synodical months (Sūrya siddhānta) = 10571.9504682 days.
- (b) $30\frac{1}{2}$ joint revolutions of sun and node (Ephemeris) = 10571.909390 days.
- (c) 29 Indian sidereal years (Sūrya siddhānta) = 10592.503924 days.
- Difference between (a) and (c) = 20.6 days.
- Difference between (a) and (b) = $+.041$ day, or $-.04258^\circ$
- This cycle of 29 years less 20.6 days is the foundation of the next two cycles.

- (4) (a) 716 synodical months (Sūrya siddhānta) = 21143.9009364 days.
- (b) 61 joint revolutions of sun and node (Ephemeris) = 21143.818780 days.
- 58 Indian sidereal years (Sūrya siddhānta) = 21185.007848 days.
- Difference between (a) and (c) = 41.107 days.
- Difference between (a) and (b) = $+.082156$ day or $.08516^\circ$
- This cycle of 58 years, less 41.1 days, is the one most frequently used in Table IV-L., *Indian Ephemeris*, pp. 336–355.

- (5) (a) 521 sidereal years (modern) = 190298.56356 days.
- (b) 521 Julian years (modern and tropical) = 190295.25 days.
- (c) 521 sidereal years (Sūrya siddhānta) = 190299.81396 days.
- (d) 6,444 synodical months (Indian or modern) = 190295.109072 days.
- (e) 549 joint revolutions of sun and node (Ephemeris) = 190294.36902 days.
- Difference between (a) and (e) = 0.74 day or 0.76444° ; difference between (c) and (d) = 4.7 days; and the difference between (b) and (d) = 0.14 day.

(f) In 521 Indian sidereal years, *less* 4·7 days, the moon's anomaly moves 3·1 days. (Eye-table e).

N.B.—(i) All the quantities in this cycle of 521 Julian years are 18 times those in (3), the cycle of 29 years *less* 20 days, or 9 times those in (4), the cycle of 58 years *less* 41·1 days.

(ii) After 521 Julian years, eclipses recur on the same day of the European calendar (Old style). This can be verified by means of Table II in the larger work. For instance, the solar eclipse on June 9, A.D. 1, is repeated on June 10, A.D. 522. But when one of two eclipses, compared at an interval of 521 years, occurred before 14th September A.D. 1752 (when the new style was introduced into the United Kingdom) and another occurred after the above date, the day of the month will be increased by 10 or 11 days.

80. The cycles of recurrence used in Table IV-L of the larger work, are (1) 18 years *plus* 10·66344 days, and (4) *supra*, 58 years *less* 41·107 days, and combinations of these, as noted at the top of the several columns in that table. Cycle No. (3) *supra*, 29 years *less* 20·6 days, is a good cycle for the half joint-revolution of the sun and node, and because an eclipse may occur when the sun is at either node, and at the end of 29 years *less* 20·6 days, the sun is only 0·04 degree nearer to or further from the node than he was at the beginning of this period, it follows that eclipses occur regularly at the end of every 29 years *less* 20 days. It is noted in the *Encyclopædia Britannica* (Art. *Eclipse*) that, starting from the eclipse of Nineveh, June 15, 763 B.C., we find eclipses on May 27, 734 B.C., May 7, 705 B.C., and so on, in an unbroken series for 2,600 years down to A.D. 1843, A.D. 1872 and A.D. 1901. *i.e.*, once in 29 years *less* 20 days, the last being the 93rd of the series.

81. The disadvantage of cycles of 29 years *less* 20·6 days in chronological investigation is that we have to reckon by half joint-revolutions of the sun and node. By doubling this cycle to 58 years *less* 41·1 days, we secure the recurrence of meetings of the sun and node in the same degree of longitude.

82. But a pure cycle of 58 years *less* 41·1 days, like a pure saros of 18 years *plus* 10·7 days, has the disadvantage of accumulating, in a long period of time, the small difference in longitude noted above to what may turn out to be a considerable amount. Thus at the end of 9 cycles of 58 years *less* 41·1 days, or 521 Julian years, or 521 Indian sidereal years *less* 4·7 days, the sun will be at the same distance from the node as at the beginning of this period, *less* 0·76 of a degree. The probability of an eclipse is not much affected by this difference, but after five such periods, the distance is less by $5 \times \cdot 76 = 3\cdot 8^\circ$, and if the distance of the sun from the node was 164° at the beginning of the period, at which distance an eclipse is within the bounds of possibility, it would, at the end of 5×521 , or 2,605 years, be 164° *less* $3\cdot 8^\circ$ or $160\cdot 2^\circ$, at which distance an eclipse is impossible.

83. To avoid such accumulation of cyclic differences in a long period of time, and still more to avoid the accumulation of $\pm 47^\circ$ for every saros of 18 years, we vary the cycles, as will be seen from the headlines of Table IV-L, in a way as to prevent any cyclic variation exceeding $\cdot 29$ of a degree. This is effected by combining the 58 years cycle occasionally with the saros of 18 years, that is, five times in the course of 1,711 years, after which the distance of the sun from node is exactly what it was at the beginning of the 1,711 years' cycle.

For

1,711 Indian sidereal years		.. = 624957·731516 days (a).
21,163 synodical months (Sūrya siddhānta)	..	.. = 624955·833844 days (b).
1,803 joint revolutions of the sun and node	..	.. = 624955·829349 days (c).

The remarkable closeness of (b) and (c), the difference between them being only ·0045 of a day, or 39 seconds of time, or ·00467 of a degree, which is only 2 seconds of an arc, makes this cycle a very useful one in chronological investigation. The difference between (a) and (b) is only 1·9 days or just under two days, which means that if we have an eclipse say on the 35th day of the Indian solar year, A.D. 1901, there was probably another eclipse in the year 1901 *less* 1711, or A.D. 190, on the 37th day, and another in A.D. 190 *less* 1711 or 1521 A.D., *i.e.*, B.C. 1522 (*vide* remarks on *minus* A.D. years in paragraph 292, page 117 of the larger work), on the 39th day, and another in B.C. (1522 + 1711) or 3233 B.C. on the 41st day. So far as A.D. 190 and A.D. 1901 are concerned, we find this to be the case, and we know that the same must have been the case in B.C. 1522, and in B.C. 3233, though we have no records of eclipses going back so far.

84. The moon's anomaly and the sun's anomaly are important considerations in the investigation of eclipses. In 37 years *less* 62 days (*i.e.*, three times (29 years *less* 20·6 days)) the moon's anomaly, by Eye-table p, moves only ·52 of a degree; consequently, after 87 years *less* 62 days, there will not be much change due to the moon's anomaly in the relative position of the sun and the moon with reference to the node; and the *Ency. Brit.* (*loc. cit.*) therefore observes:—"In a series including every third eclipse" (*i.e.*, every eclipse after an interval of 87 years *less* 62 days) "the eclipses will be of the same character through a thousand years or more. Thus the eclipses of A.D. 1467, 1554, 1640, 1727, 1814, 1901, 1988 are total."

85. We subjoin tables showing the daily and yearly joint motions of the sun and node (1) from 1 to 99 days, and (2) from 1 to 20 years. It will, however, seldom be necessary to refer to those tables because the exact distance of the mean sun from the node at any new moon or full moon, at which an eclipse could possibly occur, in times ancient or modern, can always be ascertained at a glance from column 1 of Table IV-L, the cycle of 1711 years being used when necessary.

(1) Joint motion of sun and node from 1 to 99 days.

Days.	Degrees.	Days.	Degrees.	Days.	Degrees.
1	1°-0386	34	35°-3124	67	69°-5863
2	2°-0772	35	36°-3510	68	70°-6249
3	3°-1158	36	37°-3897	69	71°-6635
4	4°-1544	37	38°-4283	70	72°-7021
5	5°-1930	38	39°-4669	71	73°-7407
6	6°-2316	39	40°-5055	72	74°-7793
7	7°-2702	40	41°-5441	73	75°-8179
8	8°-3088	41	42°-5827	74	76°-8565
9	9°-3474	42	43°-6213	75	77°-8951
10	10°-3860	43	44°-6599	76	78°-9337
11	11°-4246	44	45°-6985	77	79°-9723
12	12°-4632	45	46°-7371	78	81°-0109
13	13°-5018	46	47°-7757	79	82°-0495
14	14°-5404	47	48°-8153	80	83°-0881
15	15°-5790	48	49°-8529	81	84°-1267
16	16°-6176	49	50°-8915	82	85°-1653
17	17°-6562	50	51°-9301	83	86°-2039
18	18°-6948	51	52°-9687	84	87°-2425
19	19°-7334	52	54°-0073	85	88°-2811
20	20°-7720	53	55°-0459	86	89°-3197
21	21°-8106	54	56°-0845	87	90°-3583
22	22°-8492	55	57°-1231	88	91°-3969
23	23°-8878	56	58°-1617	89	92°-4355
24	24°-9264	57	59°-2003	90	93°-4741
25	25°-9650	58	60°-2389	91	94°-5127
26	27°-0036	59	61°-2795	92	95°-5513
27	28°-0422	60	62°-3161	93	96°-5899
28	29°-0808	61	63°-3547	94	97°-6285
29	30°-1194	62	64°-3933	95	98°-6671
30	31°-1580	63	65°-4319	96	99°-7057
31	32°-1966	64	66°-4705	97	100°-7443
32	33°-2352	65	67°-5091	98	101°-7829
33	34°-2738	66	68°-5477	99	102°-8215

(2) Joint motion of sun and node from 1 to 20 years

Years.	Degrees.
1	19°-3582558
2	39°-7165116
3	58°-0747674
4	77°-4330232
5	96°-7912790
6	116°-1495348
7	135°-5077906
8	154°-8660464
9	174°-2243022
10	193°-5825584
11	212°-9408142
12	232°-2990700
13	251°-6573258
14	271°-0155816
15	290°-3738374
16	309°-7320932
17	329°-0903490
18	348°-4486048
19	7°-8068606
20	27°-1651164

Note.—An eclipse combined with a horoscope is a valuable chronological datum. The Paripāḍal horoscope (pp. 102-104) is a typical instance of this. The following is a recent example, for which, as well as for several other horoscopes reviewed on this work, the author is indebted to Dr. R. Shama Sastri, the indefatigable Mysore archaeologist: "Simha lagna; MARS in Makara; JUPITER in 9th house (Mina); SATURN in Kumbha; MERCURY in Mithuna; VENUS in Mina; the MOON being consumed by the Serpent (Gopata Nāgabhukta), Hastayuga (= probably the nakshatra Chitra which pairs with Hasta)." It will be shown in an addendum to this work (pp. 109, 110 below) that the horoscope belongs to Monday 25th March A.D. 1163, on which day there was a Lunar Eclipse about 9 a.m. when Simha was lagna and Nak. Chitra was current. Venus was then in Mēsha-Rishabha, not Mina and Mercury could not in any case be in Mithuna when the Sun was in Mēsha. Nevertheless, as the positions of the other planets and the time of the eclipse bear out the horoscope, the latter may be considered fully verified. This time record is extracted from a com-

mentary on the famous poem *Saundaryalāhārī*, of which the authorship, usually ascribed to the 9th century philosopher Śaṅkara, is doubtful, and in the course of which reference is made to a legend of the Tamil Saiva Saint Tirugnānasam-bandhar. The commentator evidently believed that his poet, who, he says, was named at birth *Pravarasena*, flourished the 12th century A.D.

PART III,—PANCHANG

NOTE.—The different parts of this Table are lettered in order from a to y and
All the figures, except where otherwise indicated,

2. Order of signs of zodiac or राशि and ☉s longitude at commencement	1. 0°	2. 30°	3. 60°	4. 90°
Solar months; also names of राशि	Mēṣha	Vṛiṣhābha	Mithuna	Karkatāṣka
Tamil solar month names	Chittirai	Vaṅṅāṣi	Āṇi	Āḍi
a Moment of saṅkrānti in days of solar year, and decimals of a day	0-0	30-9353	62-3556	94-0003
English date corresponding to each saṅkrānti (A.D. 1911)	Apr. 13	May 14	June 14	July 16
Order of lunar months [The same names are borne by Solar months in Bengal]	(1) वैशाख	(2) ज्येष्ठ	(3) आश्विन	(4) श्रावण
b Increase in days, (1) of lunar months, (2) of sun's anomaly	0-000	29-5306	59-0612	88-3918
c " of ☉s An. when interval between Mēṣha saṅk. and 1st N.M. in sol. yr.	0-000	1-976	3-952	5-928

Tithi equivalents in days and

d Tithi equivalent in days..	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	.98	1.97	2.95	3.94	4.92	5.91	6.89	7.88	8.86	9.84	10.84	11.81	12.80	13.78	14.77	15.75	16.73	17.72	18.70	19.69

e, f, g, Moon's equation of the centre and moon's anomaly in days and

-	-00	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20
-	-00	-11	-23	-34	-46	-58	-69	-81	-93	104	116	128	140	152	164	177	189	202	214	227	240
-	1378	1368	1359	1349	1340	1330	1320	1311	1301	1291	1281	1271	1261	1251	1241	1231	1220	1210	1199	1188	1177
+	1378	1378	1377	1406	1416	1426	1435	1445	1454	1464	1474	1484	1494	1504	1514	1524	1535	1545	1556	1567	1578
+	2755	2747	2732	2721	2710	2698	2686	2674	2663	2651	2639	2627	2615	2603	2591	2579	2565	2554	2541	2528	2515
-	0000	012	025	037	050	062	074	087	100	112	125	138	151	164	177	190	204	218	232	246	260
-	1378	1367	1357	1346	1336	1326	1315	1305	1294	1283	1272	1262	1251	1240	1228	1217	1206	1194	1182	1170	1158
+	1278	1388	1398	1409	1419	1430	1440	1451	1461	1472	1483	1494	1505	1516	1527	1538	1550	1561	1573	1585	1598
+	2755	2743	2731	2718	2706	2693	2681	2668	2656	2643	2630	2617	2604	2591	2578	2565	2551	2538	2524	2510	2495
-	0000	013	026	040	053	066	079	093	107	120	134	148	162	176	190	205	219	234	249	265	280
-	1378	1366	1355	1344	1333	1322	1310	1299	1287	1275	1264	1252	1240	1228	1215	1203	1190	1178	1164	1151	1137
+	1378	1389	1400	1412	1423	1434	1445	1457	1468	1480	1491	1503	1515	1527	1540	1551	1565	1578	1591	1604	1618
+	2755	2742	2729	2716	2702	2689	2676	2662	2649	2635	2621	2608	2594	2579	2565	2551	2536	2521	2506	2491	2575

h For tithis. Sun's equation of the centre and sun's anomaly in days of the solar

[illegible]

1 Perpetual almanac for European calendar.

Surya siddhanta constants

[N.B.—Heavy type means week-day, Sunday being 1, Monday 2, etc.]													or		Year B.C. or A.D.		Kaliyuga.		Commencement of solar year, month and date.		Fraction of day.		First new moon in solar year		Anomaly at commencement of solar year.		Year B.C. or A.D.		Kaliyuga.		Commencement of solar year, month and date.	
Centuries B.C.		1	2	3	4	5	6	7	or 0	N.B.—B.C. should be made positive thus: B.C. 44 is 44th year of century beginning with 101 B.C.—see Para 16 of Text.		Year B.C.	A.D.	Kaliyuga.	k	i	m	B.C.	k													
Centuries B.C.	{	3001	3101	3201								3201	99	Feb. 14	96235	17-34738	23-29064	1001	2101	Mar. 5												
		2301	2401	2501	2601	2701	2801	2901				3102	0	Feb. 15	57252	2-17013	4-71797	901	2201	Mar. 6												
		1601	1701	1801	1901	2001	2101	2201				3101	1	Feb. 15	83800	20-80902	11-76692	801	2301	Mar. 6												
		901	1001	1101	1201	1301	1401	1501				3001	101	Feb. 16	71363	24-27066	0-24311	701	2401	Mar. 7												
Centuries A.D. old style.	{	201	301	401	501	601	701	801				2901	201	Feb. 17	58930	27-73230	16-27388	601	2501	Mar. 8												
		500	400	300	200	100		0				2801	301	Feb. 18	46494	1-66335	1-75007	501	2601	Mar. 9												
		1200	1100	1000	900	800	700	600											401	2701	Mar. 10											
				1700	1600	1500	1400	1300				2701	401	Feb. 19	34059	5-15499	20-78084	301	2801	Mar. 11												
Centuries A.D. new style.	{				1800		1700					2601	501	Feb. 20	21624	8-58663	9-25703	201	2901	Mar. 12												
		1800	1900									2501	601	Feb. 21	09189	12-04827	25-28780	101	3001	Mar. 13												
												2401	701	Feb. 21	96754	15-50991	13-76399	1	3101	Mar. 13												
		2000	2300		2200		2100																									
Odd years in a century.	{	1	2	3	4	5	6	7	or 0	1	2	3	4	5	6	7	or 0	2301	801	Feb. 22	84319	18-97155	2-24018	100	3201	Mar. 14						
		1	2	3	..	4	5	6		..	52	53	54	55	..	56		2201	901	Feb. 23	71883	22-43319	18-27095	200	3301	Mar. 15						
		7	..	8	9	10	11	..		..	57	58	59	..	60	61	62	2101	1001	Feb. 24	59448	25-89483	6-74714	300	3401	Mar. 16						
		12	13	14	15	..	16	17		63	..	64	65	66	67	..		2001	1101	Feb. 25	47013	29-35647	22-77791	400	3501	Mar. 17						
		18	19	..	20	21	22	23		68	69	70	71	..	72	73																
		..	24	25	26	27	..	28		74	75	..	76	77	78	79		1901	1201	Feb. 26	34578	3-28752	11-25410	500	3601	Mar. 18						
		29	30	31	..	32	33	34		..	80	81	82	83	..	84		1801	1301	Feb. 27	22143	6-74916	27-28487	800	3701	Mar. 19						
		35	..	36	37	38	39	..		..	85	86	87	..	88	89	90	1701	1401	Feb. 28	09780	10-21080	15-76107	900	4001	Mar. 21						
		40	41	42	43	..	44	45		91	..	92	93	94	95	..		1601	1501	Feb. 28	97273	13-67244	4-23725	1000	4101	Mar. 22						
		46	47	..	48	49	50	51		96	97	98	99	..	..																	
		Months in	{		1	2	3	4	5	6	7	or 0																				
				Ordinary years.	Aug.	Feb.	June	Sep.	Apr.	Jan.	May																					
				Mar.		Dec.	July	Oct.																								
Leap years	..			Feb.	..	..	..	Jan.	..																							
													N.B.—Odd years in centuries B.C. should be converted into positive																			

N.B.—Odd years in centuries B.C. should be converted into positive years before adding *n*, *o* or *p* to *k*, *l*, *m*. See example in para 10 of this book.

Example.—To find week-day of 28th Jan. 1844—

Add $4 + 6 + 5 + 26$ and divide the total 41 by 7. Remainder 6 = Friday.

EYE-TABLES.

the way in which they are to be used is shown in the specimen problems at p. 93.
represent days and fractions of a day.

5. 120°	6. 150°	7. 180°	8. 210°	9. 240°	10. 270°	11. 300°	12. 330°	
Simha	Kanyā	Tulā	Vṛiṣchikā	Dhanuṣ	Makara	Kumbha	Mina	—
Avani	Purattāṣi	Aippaśi	Kārttigai	Mārgali	Tai	Māsi	Panguni	
125 4756	156 4942	186 9356	216 8289	246 3192	275 6369	305 0850	334 9053	365 2588
Aug. 16	Sep. 16	Oct. 17	Nov. 16	Dec. 15	Jan. 14	Feb. 12	Mar. 13	
(5) Bhādrapada	(6) Āṣvina	(7) Kārtika	(8) Mārgaśīra	(9) Pausa	(10) Māgha	(11) Phālguna	(12) Chaitra	
118 1223	147 6530	177 1835	206 7141	236 2447	265 7753	295 3059	324 8365	354 3570
7 904	9 880	11 856	13 832	15 808	17 784	19 760	21 736	23 712

decimals of a day, and moon's anomalistic months.

21	22	23	24	25	26	27	28	29	30	
20 67	21 66	22 64	23 62	24 70	25 59	26 58	27 56	28 55	29 53	1 month = 27 5545 days.
										2 months = 55 1090 days.
										12 months = 330 6540.
										13 months = 358 2085.

Moon's anomalistic months.

decimals of a day (The signs - and + are to be applied to the equation in heavy type and not to the anomaly.)

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
2 53	2 67	2 80	2 94	3 08	3 23	3 38	3 53	3 69	3 85	4 01	4 19	4 37	4 56	4 76	4 98	5 21	5 48	5 78	6 14	6 70
11 66	11 55	11 43	11 31	11 19	11 07	10 94	10 81	10 67	10 53	10 38	10 23	10 07	9 90	9 71	9 51	9 30	9 06	8 78	8 43	7 90
15 89	16 00	16 12	16 24	16 36	16 49	16 61	16 75	16 88	17 03	17 17	17 33	17 49	17 66	17 84	18 03	18 25	18 49	18 77	19 12	19 65
25 02	24 89	24 75	24 61	24 47	24 32	24 18	24 02	23 87	23 73	23 54	23 36	23 18	22 99	22 79	22 58	22 34	22 08	21 73	21 41	20 86
2 74	2 89	3 04	3 20	3 36	3 52	3 69	3 87	4 05	4 24	4 44	4 65	4 88	5 13	5 40	5 72	6 11	6 73			
11 45	11 32	11 19	11 06	10 92	10 77	10 62	10 47	10 31	10 14	9 95	9 77	9 56	9 33	9 07	8 78	8 41	7 81			
16 10	16 23	16 36	16 50	16 64	16 78	16 93	17 09	17 25	17 42	17 60	17 79	18 00	18 22	18 48	18 78	19 15	19 74			
24 81	24 66	24 51	24 35	24 19	24 03	23 86	23 68	23 50	23 32	23 11	22 90	22 68	22 43	22 15	21 83	21 44	20 83			
2 96	3 13	3 30	3 47	3 65	3 84	4 03	4 24	4 46	4 68	4 93	5 20	5 52	5 90	6 42						
11 23	11 09	10 94	10 78	10 62	10 45	10 28	9 10	9 90	9 46	9 69	9 21	8 92	8 56	8 06						
16 32	16 46	16 61	16 77	16 93	17 10	17 27	17 46	17 67	17 86	18 09	18 34	18 63	18 99	19 49						
25 59	24 43	24 26	24 08	23 90	23 71	23 52	23 31	23 09	22 87	22 62	22 35	22 04	21 66	21 16						

year and decimals of a day. (The anomalies are entered in ordinary type and the equations, with appropriate signs, in heavy type.)

+01	-00	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13	-14	-15	-16	-17	-175	-118
77	80 5	84	87	90	93 5	97	100	103	107	111	115	119	123	128	132	138	145	154	164	168
266	263	260	257	254	250	247	244	240	237	233	229	225	221	216	211	206	199	190	183	175
-02	-01	-00	+01	+02	+03	+04	+05	+06	+07	+08	+09	+10	+11	+12	+13	+14	+15	+153	+154	
73	77	80 55	84	88	92	96	99	103	108	112	116	121	126	132	139	147	159	167	171 71	
271	267	263 18	259	256	252	248	244	240	236	232	227	222	217	211	205	197	185	177	171 71	

for centuries.

Surya Siddhanta - Odd years.

Fraction of day.	First new moon in solar year.	(s anomaly at commencement of solar year.	Fraction of day, marking commencement of solar year.	First new moon in solar year.	(s anomaly for beginning of solar year.	Fraction of day, marking commencement of solar year.	First new moon in solar year.	(s anomaly for beginning of solar year.	Fraction of day, marking commencement of solar year.	First new moon in solar year.	(s anomaly for beginning of solar year.
1	m		n	o	p	n	o	p	n	o	p
22662	4 91229	17 75813	2 25876	18 63889	7 04896	38 83274	29 07418	19 86899	75 1 40673	9 97888	5 13443
10226	8 37393	6 23432	5 51751	7 74719	14 09791	39 1 09150	18 18247	26 91795	76 6 66549	28 01776	12 18339
97791	11 83557	22 26500	3 77627	26 38697	21 14687	40 3 5026	7 29077	6 41231	77 9 24244	17 72606	19 23235
85356	15 29721	10 74128	4 03502	15 49437	0 64123	41 6 0901	25 92966	13 04127	78 1 18300	6 83436	26 28130
72921	18 75885	6 77205	5 29378	4 60267	7 69019	42 8 86777	15 03796	20 51022	79 1 44176	25 47325	5 77566
60486	22 22049	15 24824	6 55254	23 24156	14 73915	43 1 12652	4 14626	0 00458	80 7 0051	14 58155	12 82462
48051	25 68213	3 72443	7 81129	12 34986	21 78810	44 3 85528	22 78515	7 05354	81 9 5927	3 69985	19 87358
35615	29 14377	10 75520	8 07005	1 45815	1 28246	45 6 64404	11 89344	14 10250	82 1 21802	22 32873	26 92253
23180	3 07482	8 23139	9 32881	20 09704	8 33142	46 9 00279	1 00174	21 15146	83 1 47678	11 43703	6 41689
10745	6 53046	24 20216	10 58756	9 20534	15 38038	47 1 16155	19 64063	0 64581	84 7 3554	0 54533	13 46555
98310	9 99810	12 73835	11 81632	27 84423	22 42933	48 4 42031	8 74893	7 69477	85 9 90430	10 18422	20 51481
			12 10508	16 95253	1 92369	49 6 7906	27 38782	14 74373	86 1 28305	8 29262	0 00917
			13 36383	6 06082	8 97265	50 9 93782	16 49611	21 79269	87 1 51181	26 93140	7 05812
			14 62259	24 69971	16 02161	51 1 19658	5 60441	1 28704	88 7 77056	16 03970	14 10708
			15 88135	13 80801	23 07057	52 4 5533	24 24330	8 33600	89 1 02932	5 14800	21 15604
			16 14010	2 91631	2 56492	53 7 1409	13 35160	15 38496	90 1 28808	23 78689	0 65040
			17 39880	21 55520	9 01388	54 9 7284	2 45990	22 43392	91 1 54683	12 89519	7 69935
			18 65761	10 66530	16 66284	55 1 23160	21 09878	1 92828	92 8 0559	2 00349	14 74831
			19 91637	29 30238	23 71180	56 4 9036	10 20708	8 75723	93 1 06434	20 64237	21 79727
			20 17513	18 41068	3 20615	57 7 4911	28 84597	16 02619	94 1 32130	9 75067	1 29163
			21 43388	7 51893	10 25511	58 1 00787	17 95420	23 07515	95 1 58186	28 38956	8 34059
			22 69264	26 15787	17 30407	59 1 26663	7 06237	2 56051	96 8 4061	17 49786	15 38954
			23 95140	15 26616	24 35303	60 8 52538	25 70146	9 61846	97 1 09937	6 00616	22 43850
			24 21015	4 37446	3 84739	61 7 8414	14 80976	16 66742	98 1 35813	25 24504	1 93286
			25 46891	23 01335	10 89634	62 1 04290	3 91805	23 71638	99 1 61688	14 35333	8 98182
			26 72767	12 12165	17 94530	63 1 30165	22 55694	3 21074	100 8 7565	3 46164	16 03078
			27 98642	1 22995	24 99426	64 5 6004	11 66524	10 25970	200 7 5130	0 92328	4 50696
			28 24518	19 86884	4 45862	65 8 1817	0 77354	17 30865	300 6 2694	10 38492	20 35775
			29 50393	8 97713	11 53757	66 1 07792	14 42424	24 35761	400 5 0259	13 84657	9 01393
			30 76269	27 61602	18 58653	67 3 3868	8 52073	3 85197	500 3 7824	17 30821	25 04471
			31 1 02145	16 72432	25 63549	68 5 9543	27 15961	10 90093	600 2 5389	20 76985	13 20598
			32 28020	5 83202	5 12985	69 8 5549	16 26791	17 94958	700 1 29054	24 23149	1 99708
			33 53896	24 47151	12 17881	70 1 11295	5 37621	24 99884	800 0 0519	27 69312	18 02786
			34 79772	13 57981	19 22776	71 1 37170	24 01509	4 49320	900 8 8084	1 62418	6 50404
			35 055647	2 68810	26 27672	72 6 3046	13 12339	11 54216	1000 7 5048	5 08582	22 53482
			36 1 3123	21 32600	5 77108	73 8 8022	2 23169	18 59112	2000 5 1297	10 1716	17 51504
			37 57399	10 43529	12 82004	74 1 14797	20 87058	25 64007	3000 2 6945	15 26746	12 49527

March:	Mar. 1 ..1	Apr. 1 ..32	May 62	June 1 ..93	July 1 123	Aug. 1 154	Sep. 1 185	Oct. 1 215	Nov. 1 246	Dec. 1 276	Jan. 1 307	Feb. 1 338	Mar. 1 ..
hatiks ..	..	1	2	3	4	5	6	7	8	9	10	11	12
raction of day ..	..	0167	0333	0500	0667	0833	1000	1167	1333	1500	1667	1833	2000
hatiks ..	..	31	32	33	34	35	36	37	38	39	40	41	42
raction of day ..	..	5167	5333	5500	5667	5833	6000	6167	6333	6500	6667	6833	7000
alas ..	..	1	2	3	4	5	6	7	8	9	10	12	15
raction of day ..	..	0003	0005	0008	0011	0014	0017	0019	0022	0025	0028	0033	0042

Longitude at commencement.	Order	Names of nakshatras.	Days.	Order	Ordina- rily Vaisā- kha	Order	Ordina- rily Jyesh- tha	Order	Ordina- rily Āshā- dha	Order	Ordina- rily Śravana	Order	Ordina- rily Bhādra- padā	Order	Ordina- rily Āvinā	Order	Ordina- rily Kārtika	
Deg.	Min.				I	II	III	IV	V	VI	VII							
0	0	27 Revati	..	3	0-9892	5	0-8041	7	0-6196	9	0-4339	11	0-2488	13	0-0638	15	0-8906	
13	20	1 Āśvini	..	1-0119	4	2-0011	6	1-8160	8	1-6309	10	1-4458	12	1-2608	14	1-0757	17	1-9025
26	10	2 Bhānui	..	2-0238	5	3-0130	7	2-8279	9	2-6428	11	2-4578	13	2-2727	15	2-0876	18	2-9144
40	0	3 Kṛttikā	..	3-0357	6	4-0249	8	3-8398	10	3-6548	12	3-4697	14	3-2846	16	3-0995	19	3-9263
53	20	4 Rohini	..	4-0476	7	5-0368	9	4-8518	11	4-6667	13	4-4816	15	4-2965	17	4-1114	20	4-9382
66	40	5 Mūlāśrā	..	5-0596	8	6-0488	10	5-8637	12	5-6786	14	5-4935	16	5-3084	18	5-1233	21	5-9502
80	0	6 Ārdṛā	..	6-0715	9	7-0607	11	6-8756	13	6-6905	15	6-5054	17	6-3203	19	6-1352	22	6-9621
93	20	7 Punarvasu	..	7-0834	10	8-0726	12	7-8875	14	7-7024	16	7-5173	18	7-3322	20	7-1472	23	7-9740
106	40	8 Pūshyā	..	8-0953	11	9-0845	13	8-8994	15	8-7143	17	8-5292	19	8-3442	21	8-1591	24	8-9858
120	0	9 Āślēṣā	..	9-1072	12	10-0964	14	9-9113	16	9-7262	18	9-5412	20	9-3561	22	9-1710	25	9-9979
133	20	10 Maghā	..	10-1191	13	11-1083	15	10-9232	17	10-7382	19	10-5531	21	10-3680	23	10-1829	26	11-0097
146	40	11 Pūrva Phalguni	..	11-1310	14	12-1202	16	11-9352	18	11-7501	20	11-5650	22	11-3799	24	11-1948	27	12-0216
160	0	12 Uttara Phalguni	..	12-1430	15	13-1322	17	12-9471	19	12-7620	21	12-5769	23	12-3918	25	12-2067	1	13-0336
173	20	13 Hastā	..	13-1549	16	14-1441	18	13-9590	20	13-7739	22	13-5888	24	13-4037	26	13-2186	2	14-0455
186	40	14 Chitā	..	14-1668	17	15-1560	19	14-9709	21	14-7853	23	14-6007	25	14-4156	27	14-2306	3	15-0574
200	10	15 Svātī	..	15-1787	18	16-1679	20	15-9828	22	15-7977	24	15-6126	26	15-4276	1	16-2425	4	16-0693
213	20	16 Visākhā	..	16-1906	19	17-1798	21	16-9947	23	16-8096	25	16-6246	27	16-4395	2	16-2544	5	17-0812
226	40	17 Anurādhā	..	17-2027	20	18-1817	22	18-0066	24	17-8216	26	17-6365	1	17-4514	3	17-2663	6	18-0931
240	0	18 Jyeshthā	..	18-2144	21	19-2036	23	19-0186	25	18-8335	27	18-6484	2	18-4633	4	18-2782	7	19-1050
253	20	19 Mūlā	..	19-2264	22	20-2156	24	20-0305	26	19-8454	1	19-6603	3	19-4752	5	19-2901	8	20-1163
266	40	20 Pūrva-Āshādhā	..	20-2383	23	21-2275	25	21-0424	27	20-8573	2	20-6722	4	20-4871	6	20-3020	9	21-1289
280	0	21 Uttara-Āshādhā	..	21-2502	24	22-2394	26	22-0543	28	21-8692	3	21-6841	5	21-4990	7	21-3139	10	22-1468
293	20	22 Śravana	..	22-2621	25	23-2513	27	23-0662	2	22-8811	4	22-6960	6	22-5109	8	22-3259	11	23-1527
306	40	23 Śraviṣṭhā	..	23-2740	26	24-2632	1	24-0781	3	23-8930	5	23-7079	7	23-5229	9	23-3378	12	24-1646
320	0	24 Śatabhisaj	..	24-2859	27	25-2571	2	25-0900	4	24-9040	6	24-7109	8	24-5248	10	24-3497	13	25-1765
332	20	25 Pūrva-Bhādrapadā	..	25-2978	1	26-2870	3	26-1019	5	25-9169	7	25-7318	9	25-5467	11	25-3616	14	26-1884
346	40	26 Uttara-Bhādrapadā	..	26-3098	2	27-2930	4	27-1139	6	26-9288	8	26-7437	10	26-5586	12	26-3735	15	27-2003
		27 Revati	..	27-3217	3	28-3109	5	28-1258	7	27-9407	9	27-7556	11	27-5703	13	27-3854	16	28-2123
					4	29-3228	6	29-1377	8	28-9526	10	28-7675	12	28-5824	14	28-3973	17	29-2242
															15	29-4093		

Longitude at commencement.			Order.	Names of yogas.	Days.	v Shortest interval in days from new moon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Deg.	Min.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1	Dec. 1	Jan. 1	Feb. 1	Mar. 1
April ..	1	31	62	92	123	154	184	215	245	276	307	335

NAKSHATRAS.

w										x										y															
1	6	0708	18	5	46750	23	6	2721	1	6	8700	6	7	4671	11	8	0642	23	6	7053	18	5	46750	23	6	2721	1	6	8700	6	7	4671	11	8	0642
14	6	0203	19	6	6173	24	7	2144	2	7	8115	7	8	4086	12	9	0657	1	3	97117	02	00278	34	4732	66	09180	98	13611	1	3	97117	02	00278	34	4732
15	6	9618	20	7	5588	25	8	1759	3	8	7530	8	9	3501	13	9	9472	2	3	83198	03	00417	35	04872	67	09326	99	13780	2	3	83198	03	00417	35	04872
16	7	9032	21	8	5003	26	9	0971	4	9	0845	9	10	2916	14	10	8886	3	4	75306	04	00575	36	05011	68	09465			3	4	75306	04	00575	36	05011
17	8	8447	22	9	4148	27	10	0389	5	10	6360	10	11	2331	15	11	8301	4	5	44141	05	00835	37	05289	69	09743			4	5	44141	05	00835	37	05289
18	9	7862	23	10	3833	1	11	9804	6	11	5775	11	12	1745	16	12	7716	5	6	55360	06	00936	38	05510	70	09911			5	6	55360	06	00936	38	05510
19	10	7277	24	11	3248	2	12	9219	7	12	5590	12	13	1169	17	13	7131	6	7	47522	07	00971	39	05748	71	09982			6	7	47522	07	00971	39	05748
20	11	6692	25	12	2663	3	13	8634	8	13	4604	13	14	0575	18	14	6546	7	8	33903	08	01113	40	05568	72	10022			7	8	33903	08	01113	40	05568
21	12	6107	26	13	2078	4	13	8048	9	14	4019	14	14	0690	19	15	5861	8	9	29984	09	01252	41	05797	73	10161			8	9	29984	09	01252	41	05797
22	13	5522	27	14	1493	5	14	7462	10	15	3434	15	15	9105	20	16	5376	9	10	85765	10	01392	42	05846	74	10300			9	10	85765	10	01392	42	05846
23	14	4937	1	15	9807	6	15	6878	11	16	2849	16	16	8820	21	17	4791	10	11	71846	11	01530	43	05985	75	10439			10	11	71846	11	01530	43	05985
24	15	4352	2	16	9322	7	16	6293	12	17	2264	17	17	8235	22	18	4206	11	12	57927	12	01670	44	06124	76	10578			11	12	57927	12	01670	44	06124
25	16	3766	3	16	9737	8	17	5708	13	18	1679	18	18	7650	23	19	3621	12	13	41008	13	01809	45	06263	77	10788			12	13	41008	13	01809	45	06263
26	17	3181	4	17	9152	9	18	5123	14	19	1091	19	19	7065	24	20	3935	13	14	30980	14	01949	46	06493	78	20851			13	14	30980	14	01949	46	06493
27	18	2596	5	18	8567	10	19	4538	15	20	0509	20	20	6179	25	21	2450	14	15	21617	15	02088	47	06542	79	10996			14	15	21617	15	02088	47	06542
1	19	2011	6	19	7982	11	20	3953	16	20	9924	21	21	5894	26	22	1865	15	16	22351	16	02277	48	06681	80	11135			15	16	22351	16	02277	48	06681
3	20	1426	7	20	7397	12	21	3368	17	21	9938	22	22	5360	27	23	1280	16	17	14113	17	02504	49	06820	81	11274			16	17	14113	17	02504	49	06820
3	21	0841	8	21	6512	13	22	2783	18	22	8758	23	23	4724	1	24	0095	17	18	16191	18	02645	51	07098	83	11553			17	18	16191	18	02645	51	07098
4	22	0256	9	22	3227	14	22	2197	19	23	8108	24	24	4184	2	25	0110	18	19	16575	19	02784	52	07238	84	11692			18	19	16575	19	02784	52	07238
5	23	0671	10	23	3642	15	24	1612	20	24	7863	25	25	3354	3	25	0529	19	20	32656	20	02923	53	07377	85	11831			19	20	32656	20	02923	53	07377
6	23	9086	11	24	3056	16	25	1027	21	25	6998	26	26	2969	4	26	8940	20	21	32656	21	02923	53	07377	85	11831			20	21	32656	21	02923	53	07377
7	24	8501	12	25	4471	17	26	0942	22	26	6113	27	27	2384	5	27	8355	21	22	18737	22	03063	54	07516	86	11970			21	22	18737	22	03063	54	07516
8	25	7915	13	26	3886	18	26	9857	23	27	5828	1	28	1799	6	28	7769	22	23	104818	23	03291	55	07655	87	12169			22	23	104818	23	03291	55	07655
9	26	7330	14	27	3301	19	27	9272	24	28	5243	2	29	1214	7	29	09089	24	25	09089	25	03340	56	07795	88	12249			23	24	09089	25	03340	56	07795
10	27	6745	15	28	2716	20	28	8687	25	29	4638	3	30	5923	8	30	71080	25	26	71080	26	03480	57	07934	89	12388			24	25	71080	26	03480	57	07934
11	28	6100	16	29	2131	21	0	2796	26	0	8767	4	1	4737	9	31	63961	26	27	63961	27	03619	58	08073	90	12527			25	0	8767	27	03619	58	08073
12	0	0269	17	0	6240	22	1	2211	27	1	8182	5	2	4152	10	32	49142	27	28	49142	28	03758	59	08212	91	12666			26	1	8182	28	03758	59	08212
13	0	0684	18	1	5655	22	2	1626	1	2	7693	6	3	3567	11	33	63897	28	29	63897	29	03851	60	08351	92	12805			27	2	7693	29	03851	60	08351
14	1	9099	19	2	5079	24	3	1041	2	3	7011	7	4	2982	12	34	71076	29	30	71076	30	04036	61	08490	93	12945			28	3	1041	30	04036	61	08490
15	2	8514	20	3	4485	25	4	0455	3	4	6426	8	5	2397	13	35	80473	30	31	80473	31	04176	62	08630	94	13084			29	4	0455	31	04176	62	08630
3	7	7929	21	4	3900	26	5	9870	4	5	5384	9	6	1812	14	36	90415	31	32	90415	32	04315	63	08769	95	13223			30	5	9870	32	04315	63	08769
17	4	7344	22	5	3314	27	6	5928	5	6	5566	10	7	1227	15	37	94454	32	33	94454	33	04454	64	08908	96	13302			31	6	5566	33	04454	64	08908

PANCHANG EYE TABLES (Y)

Y. Calendar to be used as directed in specimen problem II on p 93 for ascertaining the A.D. month and day corresponding to any solar date, lunar tithi, nakshatra, yoga or karana.

Day of solar year.	Ending moment of tithi.	Tithi No.	☾'s An. for each tithi.	Day of solar year.	Ending moment of tithi.	Tithi No.	☾'s An. for each tithi.	Day of solar year.	Ending moment of tithi.	Tithi No.	☾'s An. for each tithi.	Day of solar year.	Ending moment of tithi.	Tithi No.	☾'s An. for each tithi.	Day of solar year.	Ending moment of tithi.	Tithi No.	☾'s An. for each tithi.				
Vaisakha.				Ashadha—cont.				Bhadrapada—cont.				Kartika—cont.				Pausha—cont.				Phalgun—cont.			
0	9843	1	0-984	64	9673	6	9-858	128	9502	11	18-732	192	9332	1	0-051	256	9161	6	8-925	320	8991	11	17-798
1	9687	2	1-969	65	9516	7	10-842	129	9346	12	19-716	193	9175	2	1-035	257	9005	7	9-909	321	8834	12	18-783
2	9530	3	2-953	66	9360	8	11-827	130	9189	13	20-700	194	9019	3	2-020	258	8848	8	10-893	322	8678	13	19-767
3	9374	4	3-937	67	9203	9	12-811	131	9033	14	21-685	195	8862	4	3-004	259	8692	9	11-878	323	8521	14	20-751
4	9217	5	4-921	68	9047	10	13-795	132	8876	15	22-669	196	8706	5	3-988	260	8535	10	12-862	324	8365	15	21-736
5	9061	6	5-906	69	8891	11	14-780	133	8720	1	23-654	197	8549	6	4-973	261	8379	11	13-846				
6	8904	7	6-890	70	8734	12	15-764	134	8563	2	24-638	198	8393	7	5-957	262	8222	12	14-831	Chaitra (when there is no adhika masa).			
7	8748	8	7-875	71	8578	13	16-749	135	8407	3	25-622	199	8236	8	6-941	263	8066	13	15-815				
8	8592	9	8-859	72	8421	14	17-733	136	8251	4	26-607	200	8080	9	7-926	264	7909	14	16-799				
9	8435	10	9-843	73	8265	15	18-717	137	8094	5	0-036	201	7924	10	8-910	265	7753	15	17-784	325	8208	1	22-720
10	8279	11	10-827	74	8108	1	19-702	138	7938	6	1-021	202	7767	11	9-894					326	8052	2	23-705
11	8122	12	11-812	75	7952	2	20-686	139	7781	7	2-005	203	7611	12	10-879					327	7895	3	24-689
12	7966	13	12-797	76	7795	3	21-670	140	7625	8	2-989	204	7454	13	11-863	Magha.				328	7739	4	25-673
13	7809	14	13-781	77	7639	4	22-655	141	7468	9	3-974	205	7298	14	12-848	266	7597	1	18-768	329	7582	5	26-658
14	7652	15	14-765	78	7482	5	23-639	142	7312	10	4-958	206	7141	15	13-832	267	7440	2	19-753	330	7426	6	0-087
15	7496	1	15-750	79	7326	6	24-623	143	7155	11	5-942					268	7284	3	20-737	331	7269	7	1-072
16	7340	2	16-734	80	7169	7	25-608	144	6999	12	6-927	Margasirsha.				269	7127	4	21-721	332	7113	8	2-056
17	7183	3	17-718	81	7013	8	26-592	145	6842	13	7-911	207	6985	1	14-816	270	6971	5	22-706	333	6957	9	3-040
18	7027	4	18-703	82	6856	9	0-022	146	6686	14	8-896	208	6828	2	15-801	271	6814	6	23-690	334	6800	10	4-025
19	6870	5	19-687	83	6700	10	1-006	147	6529	15	9-880	209	6672	3	16-785	272	6658	7	24-674	335	6644	11	5-009
20	6714	6	20-671	84	6543	11	1-991					210	6515	4	17-769	273	6501	8	25-659	336	6487	12	5-993
21	6557	7	21-656	85	6387	12	2-975	Asvina.				211	6359	5	18-754	274	6343	9	26-643	337	6331	13	6-978
22	6401	8	22-640	86	6231	13	3-959	148	6373	1	10-864	212	6202	6	19-738	275	6188	10	0-073	338	6174	14	7-962
23	6244	9	23-624	87	6074	14	4-944	149	6216	2	11-849	213	6046	7	20-722	276	6032	11	1-057	339	6018	15	8-947
24	6088	10	24-009	88	5918	15	5-928	150	6060	3	12-833	214	5889	8	21-707	277	5875	12	2-041	340	5961	1	9-931
25	5932	11	25-593					151	5904	4	13-817	215	5733	9	22-691	278	5719	13	3-026	341	5705	2	10-915
26	5775	12	26-577	Shravana.				152	5747	5	14-802	216	5576	10	23-675	279	5562	14	4-010	342	5548	3	11-900
27	5619	13	0-007	89	5591	1	6-912	153	5591	6	15-786	217	5420	11	24-660	280	5406	15	4-995	343	5532	4	12-884
28	5462	14	0-992	90	5434	2	7-897	154	5434	7	16-770	218	5264	12	25-644	281	5249	1	5-979	344	5516	5	13-868
29	5306	15	1-976	91	5278	3	8-881	155	5278	8	17-755	219	5107	13	26-628	282	5093	2	6-963	345	5492	6	14-853
				92	5121	4	9-865	156	5121	9	18-739	220	4951	14	0-058	283	4937	3	7-948	346	5476	7	15-837
Jyeshtha				93	4965	5	10-830	157	4965	10	19-723	221	4794	15	1-043	284	4780	4	8-932	347	5460	8	16-821
30	5149	1	2-960	94	4808	6	11-834	158	4808	11	20-708	222	4638	1	2-027	285	4624	5	9-916	348	5444	9	17-806
31	4993	2	3-945	95	4652	7	12-818	159	4652	12	21-692	223	4481	2	3-011	286	4467	6	10-901	349	5428	10	18-790
32	4836	3	4-929	96	4495	8	13-803	160	4495	13	22-676	224	4325	3	3-996	287	4311	7	11-885	350	5412	11	19-774
33	4680	4	5-913	97	4339	9	14-787	161	4339	14	23-661	225	4168	4	4-980	288	4154	8	12-869	351	5396	12	20-759
34	4523	5	6-898	98	4182	10	15-771	162	4182	15	24-645	226	4012	5	5-964	289	3998	9	13-854	352	5380	13	21-743
35	4367	6	7-882	99	4026	1	16-756	163	4026	1	25-630	227	3855	6	6-949	290	3841	10	14-838	353	5364	14	22-727
36	4210	7	8-866	100	3869	2	17-740	164	3869	2	26-614	228	3699	7	7-933	291	3685	11	15-822	354	5348	15	23-712
37	4054	8	9-851	101	3713	3	18-725	165	3713	3	0-044	229	3542	8	8-917	292	3528	12	16-807				
38	3898	9	10-835	102	3556	4	19-709	166	3556	4	1-028	230	3386	9	9-902	293	3372	13	17-791	Chaitra (when there is adhika masa).			
39	3741	10	11-819	103	3399	5	20-693	167	3399	5	2-012	231	3322	10	10-886	294	3215	14	18-775	355	5332	1	24-696
40	3585	11	12-804	104	3242	6	21-678	168	3242	6	2-997	232	3073	11	11-870	295	3059	15	19-760	356	5316	2	25-681
41	3428	12	13-788	105	3085	7	22-662	169	3087	7	3-981	233	2916	12	12-855					357	5299	3	26-665
42	3272	13	14-773	106	2928	8	23-646	170	2931	8	4-965	234	2760	13	13-839	Phalgun.				358	5283	4	0-093
43	3115	14	15-757	107	2771	9	24-631	171	2774	9	5-950	235	2604	14	14-824	296	2902	1	20-744	359	5267	5	1-079
44	2959	15	16-741	108	2614	10	25-615	172	2618	10	6-934	236	2447	15	15-808	297	2746	2	21-729	360	5251	6	2-063
45	2802	1	17-726	109	2457	11	26-599	173	2461	11	7-918					298	2589	3	22-713	361	5235	7	3-048
46	2646	2	18-710	110	2300	12	27-583	174	2303	12	8-903					299	2433	4	23-697	362	5219	8	4-032
47	2489	3	19-694	111	2143	13	28-567	175	2146	13	9-887	Pausha.				300	2277	5	24-682	363	5203	9	5-016
48	2333	4	20-679	112	1986	14	29-551	176	1992	14	10-872	237	2291	1	16-792	301	2120	6	25-666	364	5187	10	6-001
49	2176	5	21-663	113	1829	15	30-535	177	1835	15	11-856	238	2134	2	17-777	302	1964	7	26-650	365	5171	11	6-985
50	2020	6	22-647	114	1672	1	31-519					239	1978	3	18-761	303	1807	8	0-080	366	5155	12	7-969
51	1863	7	23-632	115	1515	2	32-503	178	1679	1	12-840	240	1821	4	19-745	304							

Names of years in Jupiter's Cycle. (S. India.)

1	Prabhava	9	67	10	27	10	87	11	47	12	07	12	67	13	27	13	87	14	47	15	07	15	67	16	27	16	87	17	47	18	07	18	67	19	27
2	Vibhava	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28		
3	Sukla	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29		
4	Pramodhuta	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30		
5	Prajapati	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31		
6	Angirasa	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32		
7	Srinukha	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33		
8	Bhava	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34		
9	Yuva	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35		
10	Dhatri	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36		
11	Isvara	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37		
12	Bahudhanya	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38		
13	Pramati	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39		
14	Vikrama	80	40	110	60	20	80	40	140	60	20	80	40	140	60	20	80	40	170	60	20	80	40	170	60	20	80	40	170	60	20	80	40		
15	Vrisha	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41		
16	Chitrabhanu	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42		
17	Subhanu	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43		
18	Tarana	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44		
19	Partiva	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45		
20	Vyaya	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46		
21	Sarvajit	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47		
22	Sarvadhari	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48		
23	Virodhi	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49		
24	Vikrita	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50		
25	Khara	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51		
26	Nandana	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52		
27	Vijaya	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53		
28	Jaya	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54		
29	Manmatha	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55		
30	Durmukha	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56		
31	Hemalamba	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57	17	77	37	97	57		
32	Vilamba	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58	18	78	38	98	58		
33	Vikari	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59	19	79	39	99	59		
34	Sarvari	100	60	20	80	40	130	60	20	80	40	130	60	20	80	40	160	60	20	80	40	160	60	20	80	40	190	60	20	80	40	190	60		
35	Plava	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61	21	81	41	01	61		
36	Subhakrit	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62	22	82	42	02	62		
37	Sobhana (Sobhakrit)	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63	23	83	43	03	63		
38	Krodhi	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64	24	84	44	04	64		
39	Visvasvasu	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65	25	85	45	05	65		
40	Parabhava	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66	26	86	46	06	66		
41	Plavanga	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67	27	87	47	07	67		
42	Kilaka	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68	28	88	48	08	68		
43	Saumya	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69	29	89	49	09	69		
44	Sadharana	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70	30	90	50	10	70		
45	Virodhakrit	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71	31	91	51	11	71		
46	Paridhavi	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72	32	92	52	12	72		
47	Pramadicha	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73	33	93	53	13	73		
48	Ananda	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74	34	94	54	14	74		
49	Rakshasa	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75	35	95	55	15	75		
50	Anala (Nala)	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76	36	96	56	16	76		
51	Pingala	17	77	37	97	57	17	77	37																										

Table T.L.—For converting mean time into local time and for calculating lagna.

Lat. 8° Long. +200° = +003 of day.		Lat. 13° Long. +012. Lat. 18° Long. +238° = -005 of day.		Lat. 23° Long. -20° Lat. 28° Long. +460° = -000 of day.		Lat. 33° Long. -180° = -0055 of day.	
Day of Solar year.	Eqn. of time in seconds.	Eqn. of time in seconds.	Eqn. of time in seconds.	Eqn. of time in seconds.	Eqn. of time in seconds.	Eqn. of time in seconds.	Eng. date.
A.D. 1800—2000	○'s trop. long. in seconds. Total correction—fraction of a day Trivandrum.	○'s trop. long. in seconds. Total correction—fraction of a day Madras.	○'s trop. long. in seconds. Total correction—fraction of a day Satara.	○'s trop. long. in seconds. Total correction—fraction of a day Indore.	○'s trop. long. in seconds. Total correction—fraction of a day Mathura.	○'s trop. long. in seconds. Total correction—fraction of a day Jhelum.	
1	447 +31 +006	428 +39 +017	409 +48 +002	389 +58 +009	367 +68 +018	343 +79 +010	13
2	445 61 ..	426 78 ..	407 95 ..	387 115 +010	364 135 ..	341 158 +011	14
3	443 92 ..	424 118 +018	405 144 +003	385 173 ..	363 204 +019	340 238 +012	15
4	440 123 +007	423 157 ..	404 193 +004	384 230 +011	362 272 +020	339 317 ..	16
5	438 153 ..	421 196 +019	402 241 ..	382 288 +012	360 341 +021	337 396 +013	17
6	436 184 ..	419 235 ..	400 289 +005	380 346 ..	359 409 +022	336 475 +014	18
7	434 215 +008	417 274 +020	398 338 ..	379 403 +013	357 477 ..	334 554 +015	19
8	432 245 ..	415 314 ..	396 386 +006	376 461 +014	355 545 +023	332 634 +016	20
9	429 276 ..	412 351 +021	394 434 ..	374 518 ..	353 613 +024	330 713 +017	21
10	426 307 +000	409 388 ..	391 483 +007	372 576 +015	351 681 +025	328 792 +018	22
11	425 337 ..	407 428 +022	388 531 ..	369 634 +016	348 749 ..	326 871 +019	23
12	421 368 ..	404 467 ..	386 579 +008	367 691 ..	346 817 +026	324 950 ..	24
13	418 399 ..	401 506 ..	383 627 ..	364 749 ..	344 885 ..	322 1030 +020	25
14	415 429 ..	398 545 ..	380 676 ..	362 806 +017	341 953 +027	319 1109 ..	26
15	413 460 +010	395 584 ..	377 724 +009	359 854 ..	338 1022 ..	316 1188 +021	27
16	409 491 ..	392 624 +023	374 772 ..	356 922 +018	335 1090 +028	314 1267 +022	28
17	405 521 ..	388 663 ..	371 821 ..	353 979 ..	333 1158 ..	312 1346 ..	29
18	402 552 ..	385 702 ..	367 869 +010	350 1037 ..	330 1226 +029	310 1426 +023	30
19	398 583 ..	382 741 ..	364 917 ..	346 1094 +019	327 1294 ..	308 1505 ..	1
20	394 613 ..	377 780 +024	360 966 ..	343 1152 ..	325 1362 +030	306 1584 +024	2
21	390 644 +011	374 820 ..	357 1014 +011	340 1210 +020	323 1430 ..	304 1663 +025	3
22	387 675 ..	370 859 ..	353 1062 ..	338 1267 ..	321 1498 +031	302 1742 ..	4
23	384 705 ..	368 898 ..	349 1110 ..	336 1325 ..	319 1566 ..	300 1822 +026	5
24	381 736 ..	366 937 +025	346 1159 +012	334 1382 +021	317 1634 +032	298 1901 ..	6
25	378 767 ..	364 976 ..	341 1207 ..	332 1440 ..	315 1703 ..	296 1980 +027	7
26	375 797 ..	362 1016 ..	337 1255 ..	330 1498 +022	313 1771 +033	294 2059 +028	8
27	372 828 +012	360 1055 ..	333 1304 +013	328 1555 ..	311 1839 ..	292 2138 ..	9
28	369 859 ..	358 1094 +026	329 1352 ..	326 1613 +023	309 1907 +034	290 2218 +029	10
29	366 889 ..	356 1123 ..	324 1400 ..	324 1671 ..	307 1975 ..	288 2297 ..	11
30	363 920 ..	354 1176 ..	357 1448 ..	322 1728 ..	305 2044 +035	286 2376 +030	12
31	360 931 ..	352 1194 ..	352 1473 +014	320 1762 +024	303 2085 ..	284 2426 +031	13
32	357 941 ..	350 1212 +027	346 1498 ..	318 1795 ..	301 2126 +036	282 2477 ..	14
33	354 952 ..	348 1230 ..	341 1524 ..	316 1827 +025	299 2167 ..	280 2527 +032	15
34	351 963 +013	347 1248 ..	336 1549 +015	314 1859 ..	297 2208 +037	278 2577 +033	16
35	348 973 ..	341 1266 ..	330 1574 ..	312 1892 +026	295 2248 ..	276 2628 ..	17
36	346 984 ..	335 1285 +028	324 1599 ..	310 1925 ..	293 2289 +028	274 2678 +034	18
37	344 995 ..	329 1303 ..	319 1624 +016	307 1958 ..	291 2330 ..	272 2728 ..	19
38	334 1006 ..	324 1321 ..	313 1650 ..	302 1990 +027	289 2371 +039	270 2779 +035	20
39	328 1016 +014	317 1339 ..	307 1675 ..	298 2024 ..	284 2412 ..	269 2829 +036	21
40	321 1027 ..	311 1357 +029	301 1700 +017	296 2057 +028	278 2453 +040	264 2879 ..	22
41	315 1038 ..	305 1375 ..	295 1725 ..	284 2090 ..	273 2494 ..	260 2929 +037	23
42	308 1048 ..	298 1393 ..	288 1750 ..	278 2123 ..	266 2535 ..	254 2980 ..	24
43	301 1059 ..	292 1411 ..	282 1776 ..	272 2155 ..	261 2576 ..	247 3030 ..	25
44	295 1070 ..	285 1429 ..	276 1801 ..	266 2187 ..	255 2617 ..	242 3080 ..	26
45	288 1081 ..	278 1447 ..	270 1826 ..	259 2220 ..	249 2657 ..	236 3131 ..	27
46	281 1091 ..	272 1465 ..	263 1851 ..	253 2253 ..	243 2698 ..	231 3181 ..	28
47	274 1102 ..	265 1484 ..	256 1876 ..	246 2286 ..	237 2739 ..	224 3231 ..	29
48	267 1113 ..	258 1502 ..	249 1902 ..	240 2318 ..	231 2780 ..	218 3282 ..	30
49	260 1123 ..	251 1520 ..	243 1927 ..	234 2352 ..	224 2821 ..	212 3332 ..	31
50	252 1134 ..	244 1538 ..	236 1952 ..	227 2385 ..	218 2862 +041	207 3382 ..	1
51	245 1145 ..	237 1556 ..	229 1977 ..	220 2418 ..	211 2903 ..	201 3433 +038	2
52	238 1156 ..	229 1574 +028	222 2002 ..	214 2451 ..	205 2944 ..	195 3483 ..	3
53	230 1166 ..	222 1592 ..	214 2028 ..	207 2483 ..	199 2985 ..	188 3533 ..	4
54	223 1177 ..	214 1610 ..	207 2053 ..	200 2515 ..	192 3026 ..	182 3584 ..	5
55	215 1188 ..	207 1628 ..	200 2078 ..	193 2548 ..	185 3066 ..	176 3634 ..	6
56	208 1198 ..	200 1647 ..	193 2103 ..	186 2581 ..	182 3107 ..	172 3684 ..	7
57	199 1209 ..	192 1665 ..	185 2128 ..	178 2614 ..	178 3148 ..	169 3735 ..	8
58	194 1220 ..	188 1683 ..	178 2154 ..	174 2648 ..	174 3189 ..	166 3785 ..	9
59	186 1231 ..	184 1701 ..	170 2179 ..	171 2679 ..	170 3230 ..	163 3835 ..	10
60	184 1241 +013	180 1719 ..	163 2204 ..	167 2712 ..	166 3271 ..	160 3886 ..	11
61	179 1252 ..	176 1736 ..	180 2228 ..	163 2744 ..	162 3312 ..	157 3936 ..	12
62	174 1239 ..	172 1725 ..	171 2220 ..	159 2740 ..	158 3311 ..	154 3939 +039	13
63	165 1226 ..	164 1714 ..	162 2213 +017	155 2735 +028	154 3310 +041	151 3942 +039	14
64	156 1214 ..	155 1704 ..	153 2205 ..	151 2731 ..	150 3309 ..	148 3946 ..	15
65	147 1201 ..	146 1693 ..	145 2198 ..	143 2726 ..	141 3308 ..	138 3949 ..	16
66	138 1188 ..	137 1682 ..	135 2190 ..	134 2722 ..	132 3306 ..	130 3952 ..	17
67	129 1176 ..	128 1671 ..	126 2182 ..	125 2718 ..	123 3305 ..	121 3955 ..	18
68	120 1163 ..	119 1660 ..	117 2175 ..	116 2713 ..	114 3304 +042	112 3958 ..	19
69	110 1150 ..	109 1650 ..	108 2167 ..	107 2709 ..	105 3303 ..	103 3962 ..	20
70	101 1137 ..	100 1639 ..	99 2160 ..	98 2704 ..	96 3302 ..	95 3965 +040	21
71	91 1125 ..	91 1628 ..	90 2152 ..	88 2700 +029	87 3301 ..	86 3968 ..	22
72	82 1112 ..	81 1617 ..	80 2144 ..	79 2696 ..	78 3300 ..	77 3971 ..	23
73	72 1099 ..	72 1606 +027	71 2137 ..	70 2691 ..	69 3299 ..	68 3971 ..	24

Table T.L.—For converting mean time into local time and for calculating lagna.

Day of Solar year.	Lat. 8° Long. +390" = +003 of day.		Lat. 13° Long. +012		Lat. 18° Long. +288" = -005 of day.		Lat. 23° Long. -290" = -000 of day.		Lat. 28° Long. +160" = +005 of day.		Lat. 33° Long. -480" = -0055 of day.		Eag. date.
	Eqn. of time in seconds.	Q's trop. long. in seconds.	Eqn. of time in seconds.	Q's trop. long. in seconds.	Eqn. of time in seconds.	Q's trop. long. in seconds.	Eqn. of time in seconds.	Q's trop. long. in seconds.	Eqn. of time in seconds.	Q's trop. long. in seconds.	Eqn. of time in seconds.	Q's trop. long. in seconds.	
	A.D. 1800-2000		A.D. 1800-2000		A.D. 1800-2000		A.D. 1800-2000		A.D. 1800-2000		A.D. 1800-2000		
74	-63+1086+012		+62+1596+027		-62+2129		-61+2686+028		-60+3235		-58+3978+039		25
75	54 1074		54 1585		53 2122		53 2682		52 3247		51 3981		26
76	43 1061		43 1574		43 2114+016		42 2678		41 3235		41 3984		27
77	34 1048		34 1563		33 2106		33 2674		32 3224		32 3987		28
78	25 1035		24 1552+026		24 2099		24 2669		23 3213		23 3980		29
79	15 1023		15 1542		15 2091		15 2665+027		14 3202+040		14 3974		30
80	5 1010		5 1531		5 2084		5 2660		5 3201		5 3997		1
81	+4 997+011		+4 1520		+4 2076+015		+4 2656		+4 3200		+4 4000		2
82	14 985		14 1509		14 2066		13 2652		13 3209+039		13 4003		3
83	23 972		23 1498		23 2061		23 2647+026		22 3208		22 4006		4
84	33 959		33 1488+025		33 2053		32 2643		32 3207		30 4010		5
85	43 946		43 1477		42 2046		42 2638		41 3206		40 4013		6
86	52 934		52 1466		51 2038+014		51 2634		50 3204+038		49 4016		7
87	61 921+010		61 1455		60 2030		60 2630+025		59 3203		57 4019		8
88	71 908		71 1444		70 2023		69 2625		68 3202		67 4022		9
89	81 895		80 1434		79 2015		78 2621		77 3201+037		76 4026+034		10
90	90 883		90 1423+024		88 2008		87 2616		86 3200		84 4029		11
91	104 870		105 1412		106 2000+013		107 2612		109 3200		110 4032		12
92	114 847		115 1388		116 1972		117 2581		119 3200		121 3994		13
93	124 825		124 1363		126 1945		127 2551		129 3212+036		131 3956+033		14
94	133 802		134 1339		136 1917		137 2520+024		139 3178		141 3918		15
95	143 780+009		144 1314		146 1890		147 2490		149 3144		151 3880		16
96	153 757		154 1290+023		155 1862		157 2459+023		159 3110		162 3842+032		17
97	162 735		163 1266		165 1835+012		167 2428		169 3077+035		172 3804		18
98	172 712		173 1241		175 1807		177 2398		179 3043		182 3766		19
99	182 690		183 1217		185 1780		187 2368+022		189 3009		192 3728+031		20
100	191 667		192 1192		194 1752		196 2337		199 2975		202 3691		21
101	200 645+008		201 1168		203 1725+011		206 2306		209 2941+034		211 3653		22
102	209 622		210 1144+022		213 1697		215 2275		218 2907		221 3615+030		23
103	218 600		220 1119		222 1670		225 2245		228 2873		231 3577		24
104	228 577		229 1095		232 1642		235 2214+021		238 2839+033		242 3539+029		25
105	237 555		238 1070		241 1615		244 2184		247 2805		251 3501		26
106	246 532		247 1046		250 1587+010		253 2153		257 2771+032		261 3463+028		27
107	253 510		256 1022		259 1560		262 2122		266 2738		270 3425		28
108	261 487		266 997		268 1532		271 2092+020		275 2704		278 3387+027		29
109	271 465		274 973		277 1505		280 2061		284 2679+031		288 3349		30
110	280 442		283 948		286 1477		291 2031		293 2636		297 3311		31
111	288 420		291 924		294 1450		298 2000+019		302 2602		305 3273+026		1
112	297 397		300 900+021		303 1422+009		307 1969		311 2568+030		315 3235		2
113	306 375		308 875		312 1395		315 1939		320 2534		324 3197+025		3
114	315 352		317 857		321 1367		324 1908		329 2500		333 3159		4
115	323 330		325 826		329 1340		333 1878+018		337 2466+029		342 3121		5
116	331 307		333 802		337 1312		341 1847		345 2432		350 3084+024		6
117	338 285		341 778		345 1285+008		349 1816		353 2399+028		359 3046+023		7
118	347 262		349 753		353 1257		358 1786		362 2365		367 3008		8
119	353 239		356 728		361 1230		365 1753+017		370 2331		375 2970+022		9
120	356 217		360 704		369 1202		373 1725		378 2297+027		383 2932		10
121	359 194		364 680+020		371 1175		382 1694		394 2263		408 2894+021		11
122	362 172		368 656		379 1148+007		390 1664+016		402 2228		416 2856		12
123	365 162		375 639		386 1123		397 1631		409 2187+026		424 2806+020		13
124	372 152		382 621		394 1099		405 1599		417 2146		432 2755		14
125	379 143		389 604		400 1073+006		412 1566		424 2105+025		439 2705+019		15
126	385 133		396 587		408 1049+006		420 1534+015		433 2064+025		447 2654+019		16
127	390 123		403 569		415 1024		427 1501		440 2023		455 2604+018		17
128	396 114		409 552		421 1000		434 1469		447 1983+024		462 2554		18
129	405 104		416 535+019		428 975		441 1436+014		454 1942		469 2503+017		19
130	409 94		422 518		435 950		448 1404		461 1901+023		476 2453		20
131	415 81		428 500		441 926		454 1371		467 1860		483 2402+016		21
132	421 75		434 483		447 901+005		460 1339+013		473 1819		490 2352		22
133	427 65		440 466		453 876		467 1306		480 1778+022		497 2302		23
134	434 55		446 448		459 852		473 1274		486 1737		503 2251+015		24
135	438 45		452 431		465 827		479 1241		492 1696		509 2201		25
136	444 36		457 414		471 802		485 1209		498 1655		515 2150+014		26
137	449 26		462 396		476 777		490 1176		504 1614+021		521 2106		27
138	454 16		468 379		488 753		496 1144+012		510 1574		527 2050+013		28
139	461 6		473 362		487 728		502 1111		516 1533		533 1999		29
140	464 0		478 345		492 703		507 1079		521 1492+020		538 1949+012		30
141	469 0		483 327		497 679		512 1046		526 1451		544 1898		31
142	474 0		488 310		502 654+004		517 1014		531 1410		549 1848		1
143	478 0+009		492 292		507 629		522 981+011		536 1369+019		554 1798+011		2
144	483 0		497 275		511 605		527 949		541 1328		559 1747		3
145	484 0		501 258		516 580		531 916		546 1287		564 1697+010		4
146	486 0		505 241		520 555		536 884		550 1246+018		569 1646		5

Table T.L.—For converting mean time into local time and for calculating lagna.

[illegible]

Latitudes and Longitudes of chief places in British India and the Feudatory States.
 *Longitudes are expressed by the difference in seconds of time as compared with Ujjain.)

Serial No.	District.	Town.	Latitude in degrees and deci- mals of a degree.	Time difference in seconds.	Serial No.	District.	Town.	Latitude in degrees and deci- mals of a degree.	Time difference in seconds.
BRITISH TERRITORY.					Bombay Province—contd				
Aden Province.					37	Nasik ..	Nasik ..	20-0	-- 489
1	Aden ..	Aden ..	12-7	-- 7348	38	Panch Mahal ..	Godhra ..	22-7	-- 529
Ajmere-Merwara Province.					39	Poona ..	Poona ..	18-5	-- 461
2	Ajmere ..	{ Ajmere ..	26-5	-- 280	40	Sholapur ..	{ Sholapur ..	17-7	+ 26
3	Merwara ..	{ Nazirabad ..	26-3	-- 256			{ Pandharpur ..	17-7	-- 84
		{ Beawar (Nayanagar) ..	26-0	-- 352			{ Barsa ..	18-2	-- 24
Baluchistan Province.					41	Satara ..	Satara ..	17-7	-- 428
4	Quetta-Peshin	Quetta ..	30-2	-- 2104	42	Surat ..	Surat ..	12-2	-- 708
Bengal Province.					43	Thana ..	Banlia ..	19-0	-- 708
5	Balasore ..	Balasore ..	21-5	+ 2676	Burma Province.				
6	Bankura ..	Bankura ..	23-2	+ 2708	14	Akyab ..	Akyab ..	29-2	+ 4112
7	Bhagalpur ..	Bhagalpur ..	25-2	+ 2692	45	Amherst ..	Moulmein ..	16-0	+ 5244
8	Burdwan ..	{ Burdwan ..	23-2	+ 2896	46	Basen ..	Basen ..	16-7	+ 4556
		{ Howrah ..	22-5	+ 3016	47	Benzada ..	Benzada ..	17-7	-- 433
9	Champaran ..	Bettiah ..	26-5	+ 2092	48	Mandalay ..	Mandalay ..	22-0	+ 436
10	Cuttack ..	Cuttack ..	20-5	+ 2420	49	Prome ..	Prome ..	18-8	-- 407
11	Darbhanga ..	Darbhanga ..	26-2	+ 2428	50	Rangoon ..	Rangoon ..	16-7	+ 496
12	Gaya ..	Gaya ..	24-5	+ 2216	51	Tavoy ..	Tavoy ..	11-1	+ 4880
13	Hooghly ..	{ Hooghly and Chinsura ..	23-0	+ 3028	Central Provinces.				
14	Midnapore ..	Serampore ..	22-7	+ 3016	52	Jubbulpore ..	Jubbulpore ..	23-2	+ 1000
15	Monghyr ..	..	22-5	+ 2768	53	Nagpur ..	{ Kamptee ..	21-2	+ 820
16	Murshidabad ..	Berhampore ..	25-3	+ 2564			{ Nagpur ..	21-2	+ 800
17	Muzaffarpur ..	Hajipur ..	24-0	+ 2996	54	Nimar ..	Burhanpur ..	21-3	+ 108
		{ Muzaffarpur ..	25-7	+ 2260	55	Raipur ..	Raipur ..	21-2	+ 1408
18	Nadia ..	{ Krishnagar ..	26-0	+ 2308	56	Saugor ..	Saugor ..	23-8	+ 712
		{ Santipur ..	23-5	+ 3056	Eastern Bengal and Assam Province.				
		{ Calcutta ..	23-2	+ 3046	57	Chittagong ..	Chittagong ..	23-3	+ 3482
19	Twenty-four Parganas ..	{ Cossipur-Chitpur ..	22-5	+ 3020	58	Decca ..	{ Decca ..	23-7	+ 3508
		{ Garden Reach ..	23-0	+ 3032			{ Narayanganj ..	24-8	+ 4360
		{ Maniktala ..	22-7	+ 3020	59	Manipur ..	Imphal ..	24-5	+ 3362
		{ Naihati ..	23-0	+ 3032	60	Pabna ..	Sirajganj ..	24-5	+ 3362
		{ Baranagar ..	23-0	+ 3032	61	Rajshahi ..	Rampur-Buha ..	24-3	+ 3076
		{ Bhadrapa ..	25-7	+ 2252	Madras Province.				
20	Patna ..	{ Patna ..	25-7	+ 2252	62	Bellary ..	{ Adoni ..	15-7	+ 366
		{ Bihar ..	25-2	+ 2336			{ Bellary ..	15-2	+ 256
21	Puri ..	Dinapore ..	25-7	+ 2224	63	Chingleput ..	Conjeeveram ..	12-8	+ 940
22	Ranchi ..	Puri ..	19-6	+ 2408	64	Coimbatore ..	Coimbatore ..	11-0	+ 284
23	Ratan ..	Ranchi ..	23-3	+ 2292	65	Ganjam ..	Berhampur ..	19-3	+ 2164
24	Shahabad ..	{ Chapra ..	25-8	+ 2148			{ Cocanada ..	17-0	+ 1548
		{ Sasaram ..	25-0	+ 1976	66	Oodāvari ..	{ Rajahmundry ..	17-0	+ 1434
		{ Arrah ..	25-5	+ 2132			{ Bezwada ..	16-5	+ 1160
Benar Province.					67	Kistna ..	{ Ellore ..	16-7	+ 1280
25	Akola ..	Akola ..	20-7	+ 300			{ Masulipatam ..	16-2	+ 1284
26	Amraoti ..	Amraoti ..	21-0	+ 480	68	Guntūr ..	Guntūr ..	16-3	+ 1124
27	Ellichpur ..	Ellichpur ..	21-2	+ 424	69	Kurnool ..	Kurnool ..	15-8	+ 548
Bombay Province.					70	Madras ..	Madras ..	13-0	+ 1072
28	Ahmadabad ..	Ahmadabad ..	23-0	-- 768			{ Madras ..	10-0	+ 560
29	Ahmadnagar ..	Ahmadnagar ..	19-0	-- 208	71	Madura ..	{ Boonayakkanur ..	10-0	+ 376
30	Belgaum ..	Belgaum ..	16-0	-- 304			{ Dindigul ..	10-3	+ 528
31	Bijapur ..	Bijapur ..	16-8	-- 16			{ Calicut ..	11-2	+ 0
32	Bombay ..	Bombay ..	19-0	-- 692	72	Malabar ..	{ Cannanore ..	11-8	-- 100
33	Broach ..	{ Broach ..	21-7	-- 672			{ Palghat ..	10-8	+ 208
		{ Hubli ..	15-3	-- 152	73	Nellore ..	{ Tellicherry ..	11-7	-- 72
34	Dharwar ..	{ Dharwar ..	15-5	-- 184			{ Nellore ..	14-5	+ 1008
		{ Gadag ..	15-5	-- 36	74	North Arcot ..	{ Gudiyāttam ..	13-0	+ 744
35	Keira ..	Nadiad ..	22-7	-- 700			{ Vellore ..	12-9	+ 808
36	Khandesh ..	Dhulia ..	21-0	-- 240	75	Salem ..	Salem ..	11-7	+ 572
					76	South Arcot ..	Cuddalore ..	11-7	+ 956
					77	South Kanara ..	Mangalore ..	12-8	-- 224
					78	Tanjore ..	{ Kumbakonam ..	11-0	+ 880
							{ Negapatnam ..	10-7	+ 976

Latitudes and longitudes of chief places in British India and the Feudatory States
(Longitudes are expressed by the difference in seconds of time as compared with Ujjain.)

Serial No.	District	Town.	Latitude in degrees and decimals of a degree.	Time difference in seconds.	Serial No.	District.	Town	Latitude in degrees and decimals of a degree.	Time difference in seconds.
Madras Province—contd.					Bombay Native States—contd.				
8	Tanjore—contd.	Tanjore	10.7	+ 804	112	Kathiawar—contd.	Junagarah	21.5	+ 1244
		Mannargudi	10.7	+ 880			Narvanagar	22.4	+ 1324
		Miyavaram	11.1	+ 928			Porabandar	21.6	+ 1436
		Palamecottah	8.7	+ 472			Rejkot	22.3	+ 1188
79	Tinnevely	Rajapalaiyam	9.5	+ 424	113	Kolhapur	Wadhwan	22.6	+ 972
		Sevilliputtur	9.5	+ 440			Kolhapur	16.6	+ 364
		Tinnevely	8.7	+ 456					
		Tiru-chendur	8.5	+ 560					
		Tuticorin	8.8	+ 568					
80	Trichinopoly	Trichinopoly	10.8	+ 700					
		Srirangam							
81	Vizagapatnam	Vizagapatnam	17.7	+ 1804					
		Vizianagaram	18.2	+ 1832					
North-West Frontier Province.					Central India Agency.				
82	Dera Ismail Khan	Dera Ismail Khan	31.8	+ 1168	114	Rewah	Rewah	24.5	+ 1324
83	Kohat	Kohat	33.6	+ 1044	115	Bhopal	Bhopal	23.2	+ 392
84	Peshawar	Peshawar	34.0	+ 1068	116	Datia	Datia	25.6	+ 644
					117	Gwalior	Lashkar	26.2	+ 372
							Ujjain	23.1	+ 0
					118	Indore	Indore	22.7	+ 28
					119	Jaora	Jaora	23.6	+ 156
					120	Mandasar in Gwalior	Mandasar	21.1	+ 168
					121	Ratlam	Ratlam	23.3	+ 176
Punjab Province.					Hyderabad State.				
85	Amritsar	Amritsar	31.7	+ 216	122	Aurangabad	Aurangabad Jaina	10.8	+ 108
86	Delhi	Delhi	28.7	+ 352	123	Gulbarga	Gulbarga	17.3	+ 236
87	Dera Ghazi Khan	Dera Ghazi Khan	30.0	+ 1200	124	Hyderabad	Hyderabad	17.3	+ 640
88	Ferozepore	Ferozepore	31.0	+ 280	125	Raichur	Raichur	16.2	+ 376
89	Gurdaspur	Batala	30.8	+ 140					
90	Gujranwala	Gujranwala	32.2	+ 384					
91	Gurgaon	Rewari	28.2	+ 204					
92	Hissar	Bhiwani	28.8	+ 84					
93	Jhang	Jhang-Maghiana	31.3	+ 828	126	Jammu	Jammu	32.7	+ 208
94	Karnal	Karnal	29.7	+ 288	127	Kashmir	Srinagar	34.8	+ 228
		Panipat	29.4	+ 288					
95	Jullundur	Jullundur	31.3	+ 48					
96	Lahore	Lahore	31.6	+ 348					
		Kasur	31.1	+ 316					
97	Ludhiana	Ludhiana	31.0	+ 20					
98	Multan	Multan	30.2	+ 1024					
99	Rawalpindi	Rawalpindi	33.6	+ 640					
100	Rohtak	Rohtak	28.0	+ 192					
101	Sialkot	Sialkot	32.5	+ 300					
Sindh Province.					Kashmir State.				
102	Hyderabad	Hyderabad	25.3	+ 1768					
103	Karachi	Karachi	24.8	+ 2092					
104	Sukkur	Shikarpur	28.0	+ 1708					
		Sukkur	27.7	+ 1652					
United Provinces of Agra and Oudh.					Madras Native States.				
105	Harodi	Shehabad	27.7	+ 1000	128	Cochin	Ernakulam	10.0	+ 120
106	Sitapur	Sitapur	27.6	+ 1172			Mattancheri	10.0	+ 112
					129	Pudukkottai	Pudukkottai	10.3	+ 728
							Alleppey	9.5	+ 132
					130	Travancore	Nagercoil	8.1	+ 400
							Trivandrum	8.5	+ 280
NATIVE STATES.					Mysore State.				
Baroda State.					131	Bangalore	Bangalore	13.0	+ 432
107	Baroda	Baroda	22.3	+ 608	132	Kolar	Kolar	13.1	+ 564
108	Kadi	Patan (Anulwad)	23.8	+ 868	133	Mysore	Mysore	12.3	+ 212
109	Nayasan	Nayasan	21.0	+ 684					
Bombay Native States.					Punjab Native States.				
110	Cambay	Cambay	22.3	+ 748	134	Malar Kotla	Malar Kotla	30.3	+ 48
111	Cutch	Bhuj	23.2	+ 1436	135	Patiala	Patiala	30.3	+ 164
112	Kathiawar	Bhaunagar	21.7	+ 800					
		Dhoraji	21.7	+ 1240					
Rajputana Agency.					Rajputana Agency.				
					136	Alwar	Alwar	27.6	+ 196
					137	Bharatpur	Bharatpur	27.2	+ 412
					138	Bikaner	Bikaner	28.0	+ 596
					139	Jaipur	Sikar	27.6	+ 156
							Jaipur	26.9	+ 12
					140	Karauli	Karauli	26.5	+ 300
					141	Kotah	Kotah	25.1	+ 16
					142	Jodhpur	Jodhpur	26.3	+ 664
					143	Mewar or Udaipur	Udaipur	24.6	+ 500
					144	Tonk	Tonk	26.1	+ 4
United Provinces Native States.					United Provinces Native States.				
					145	Rampur	Rampur	28.8	+ 780

PART IV.—PLANETARY TABLES.

TABLE P.A.—Sun's mean Longitude and Equation for every complete day of the Indian Solar year

Day.	☉'s mean longitude. Degrees.	Eqn	Day.	☉'s mean longitude. Degrees.	Eqn.	Day.	☉'s mean longitude. Degrees.	Eqn.	Day.	☉'s mean longitude. Degrees.	Eqn.	Day.	☉'s mean longitude. Degrees.	Eqn.
0	357°5606	+2°1388	74	70°7952	+2°2497	147	142°7441	-1°9797	220	214°6931	-1°4820	293	286°6421	+1°0809
1	358°8462	2°1300	75	71°7808	2°2116	148	143°7298	1°9949	221	215°6787	1°4550	294	287°6277	1°1129
2	359°8318	2°1217	76	72°7664	1°735	149	144°7154	2°0078	222	216°6643	1°4268	295	288°6133	1°1447
3	0°8174	2°1134	77	73°7520	1°355	150	145°7010	2°0207	223	217°6499	1°3980	296	289°5989	1°1765
4	1°8030	2°1051	78	74°7376	0°971	151	146°6866	2°0336	224	218°6356	1°3692	297	290°5845	1°2083
5	2°7886	2°0972	79	75°7232	0°587	152	147°6722	2°0465	225	219°6212	1°3404	298	291°5701	1°2386
6	3°7742	2°0866	80	76°7088	0°203	153	148°6578	2°0594	226	220°6068	1°3096	299	292°5558	1°2689
7	4°7598	2°0760	81	77°6944	0°013	154	149°6434	2°0709	227	221°5924	1°2793	300	293°5414	1°2992
8	5°7454	2°0654	82	78°6800	0°557	155	150°6290	2°0806	228	222°5780	1°2490	301	294°5270	1°3295
9	6°7310	2°0532	83	79°6656	0°904	156	151°6146	2°0912	229	223°5636	1°2187	302	295°5126	1°3598
10	7°7166	2°0403	84	80°6512	1°324	157	152°6002	2°1018	230	224°5492	1°1869	303	296°4982	1°3882
11	8°7022	2°0274	85	81°6368	1°708	158	153°5858	2°1101	231	225°5348	1°1551	304	297°4838	1°4170
12	9°6878	2°0145	86	82°6224	2°087	159	154°5714	2°1184	232	226°5204	1°1239	305	298°4694	1°4458
13	10°6734	1°9995	87	83°6080	2°468	160	155°5570	2°1267	233	227°5060	1°0921	306	299°4550	1°4728
14	11°6590	1°9843	88	84°5936	2°849	161	156°5426	2°1350	234	228°4916	1°0588	307	300°4406	1°5000
15	12°6446	1°9691	89	85°5792	3°224	162	157°5282	2°1410	235	229°4772	1°0255	308	301°4262	1°5269
16	13°6302	1°9539	90	86°5648	3°599	163	158°5138	2°1470	236	230°4628	0°9922	309	302°4118	1°5525
17	14°6158	1°9386	91	87°5504	3°974	164	159°4994	2°1530	237	231°4484	0°9596	310	303°3974	1°5788
18	15°6014	1°9193	92	88°5360	4°345	165	160°4850	2°1595	238	232°4340	0°9252	311	304°3830	1°6089
19	16°5870	1°9020	93	89°5216	4°716	166	161°4706	2°1681	239	233°4196	0°8908	312	305°3686	1°6244
20	17°5726	1°8841	94	90°5072	5°087	167	162°4562	2°1667	240	234°4052	0°8564	313	306°3542	1°6537
21	18°5582	1°8646	95	91°4928	5°458	168	163°4418	2°1705	241	235°3908	0°8214	314	307°3398	1°6766
22	19°5438	1°8451	96	92°4784	5°816	169	164°4274	2°1717	242	236°3764	0°7861	315	308°3254	1°6995
23	20°5294	1°8256	97	93°4640	6°178	170	165°4130	2°1730	243	237°3620	0°7508	316	309°3110	1°7224
24	21°5150	1°8050	98	94°4496	6°540	171	166°3986	2°1743	244	238°3476	0°7155	317	310°2966	1°7467
25	22°5006	1°7835	99	95°4352	6°902	172	167°3842	2°1751	245	239°3332	0°6797	318	311°2822	1°7682
26	23°4862	1°7620	100	96°4208	7°254	173	168°3698	2°1739	246	240°3188	0°6435	319	312°2678	1°7897
27	24°4718	1°7405	101	97°4064	7°607	174	169°3554	2°1727	247	241°3044	0°6073	320	313°2534	1°8112
28	25°4574	1°7182	102	98°3920	7°960	175	170°3410	2°1715	248	242°2900	0°5711	321	314°2390	1°8310
29	26°4430	1°6953	103	99°3776	8°312	176	171°3266	2°1703	249	243°2756	0°5340	322	315°2246	1°8505
30	27°4286	1°6721	104	100°3632	8°655	177	172°3122	2°1689	250	244°2612	0°4969	323	316°2102	1°8700
31	28°4142	1°6495	105	101°3488	8°998	178	173°2978	2°1633	251	245°2468	0°4598	324	317°1958	1°8895
32	29°3998	1°6222	106	102°3344	9°341	179	174°2834	2°1597	252	246°2324	0°4237	325	318°1814	1°9068
33	30°3854	1°5969	107	103°3200	9°684	180	175°2690	2°1541	253	247°2180	0°3861	326	319°1670	1°9241
34	31°3710	1°5716	108	104°3056	1°0016	181	176°2546	2°1481	254	248°2036	0°3484	327	320°1526	1°9414
35	32°3566	1°5462	109	105°2912	1°0348	182	177°2402	2°1421	255	249°1892	0°3108	328	321°1382	1°9596
36	33°3422	1°5192	110	106°2768	1°0680	183	178°2258	2°1361	256	250°1748	0°2736	329	322°1238	1°9748
37	34°3278	1°4921	111	107°2624	1°1012	184	179°2114	2°1301	257	251°1604	0°2355	330	323°1094	1°9900
38	35°3134	1°4650	112	108°2480	1°1330	185	180°1970	2°1220	258	252°1460	0°1974	331	324°0950	2°0052
39	36°2990	1°4375	113	109°2336	1°1648	186	181°1826	2°1137	259	253°1316	0°1593	332	325°0806	2°0182
40	37°2846	1°4087	114	110°2192	1°1966	187	182°1682	2°1054	260	254°1172	0°1213	333	326°0662	2°0311
41	38°2702	1°3799	115	111°2048	1°2284	188	183°1538	2°0948	261	255°1028	0°0829	334	327°0518	2°0440
42	39°2558	1°3511	116	112°1904	1°2587	189	184°1394	2°0842	262	256°0884	0°0445	335	328°0374	2°0569
43	40°2414	1°3217	117	113°1760	1°2890	190	185°1250	2°0736	263	257°0740	0°0056	336	329°0230	2°0686
44	41°2270	1°2914	118	114°1616	1°3193	191	186°1106	2°0630	264	258°0596	+0°0315	337	330°0087	2°0792
45	42°2126	1°2611	119	115°1472	1°3483	192	187°0962	2°0501	265	259°0452	0°0699	338	331°0943	2°0898
46	43°1982	1°2308	120	116°1328	1°3771	193	188°0818	2°0372	266	260°0308	0°1083	339	332°1799	2°1004
47	44°1838	1°2003	121	117°1184	1°4059	194	189°0674	2°0243	267	261°0164	0°1463	340	333°2655	2°1091
48	45°1694	1°1685	122	118°1040	1°4347	195	190°0530	2°0114	268	262°0020	0°1844	341	334°3511	2°1174
49	46°1550	1°1367	123	119°0897	1°4617	196	191°0387	1°9962	269	262°9877	0°2228	342	335°4367	2°1257
50	47°1407	1°1049	124	120°0753	1°4888	197	192°0243	1°9810	270	263°9733	0°2612	343	336°5223	2°1340
51	48°1263	1°0704	125	121°0609	1°5158	198	193°0099	1°9658	271	264°9589	0°2979	344	337°6079	2°1423
52	49°1119	1°0371	126	122°0465	1°5428	199	193°9955	1°9506	272	265°9445	0°3355	345	338°6935	2°1510
53	50°0975	1°0038	127	123°0321	1°5681	200	194°9811	1°9333	273	266°9301	0°3732	346	339°7791	2°1597
54	51°0831	0°9716	128	124°0177	1°5934	201	195°9667	1°9160	274	267°9157	0°4108	347	340°8647	2°1684
55	52°0687	0°9372	129	125°0033	1°6188	202	196°9523	1°8987	275	268°9013	0°4479	348	341°9503	2°1768
56	53°0543	0°9028	130	125°9889	1°6441	203	197°9379	1°8769	276	269°8869	0°4850	349	342°0359	2°1851
57	54°0399	0°8684	131	126°9745	1°6670	204	198°9235	1°8574	277	270°8725	0°5221	350	343°1215	2°1934
58	55°0255	0°8345	132	127°9601	1°6899	205	199°9091	1°8379	278	271°8581	0°5592	351	344°2071	2°2017
59	56°0111	0°7992	133	128°9457	1°7128	206	200°8947	1°8184	279	272°8437	0°5950	352	345°2927	2°2100
60	57°0067	0°7639	134	129°9313	1°7357	207	201°8803	1°7971	280	273°8293	0°6312	353	346°3783	2°2183
61	58°0023	0°7286	135	130°9169	1°7572	208	202°8659	1°7756	281	274°8149	0°6674	354	347°4639	2°2266
62	59°0079	0°6931	136	131°9025	1°7787	209	203°8515	1°7541	282	275°8005	0°7036	355	348°5495	2°2349
63	60°0135	0°6576	137	132°8881	1°8002	210	204°8371	1°7326	283	276°7861	0°7387	356	349°6351	2°2432
64	61°0191	0°6221	138	133°8737	1°8217	211	205°8227	1°7100	284	277°7717	0°7710	357	350°7207	2°2515
65	62°0247	0°5866	139	134°8593	1°8412	212	206°8083	1°6871	285	278°7573	0°8093	358	351°8063	2°2598
66	63°0303	0°5511	140	135°8449	1°8607	213	207°7939	1°6642	286	279°7429	0°8444	359	352°8919	2°2681
67	64°0359	0°5156	141	136°8305	1°8802	214	208°7795	1°6413	287	280°7285	0°8788	360	353°9775	2°2764
68	65°0415	0°4801	142	137°8161	1°8974	215	209°7651	1°6160	288	281°7141	0°9132	361	354°0631	2°2847
69	66°0471	0°4446	143	138°8017	1°9147	216	210°7507	1°5907	289	282°6997	0°9476	362	355°1487	2°2930
70	67°0527	0°4091	144	139°7873	1°9320	217	211°7363	1°5654	290	283°6853	0°9810	363	356°2343	2°3013
71	68°0583	0°3736	145	140°7729	1°9493	218	212°7219	1°5399	291	284°6709	1°0143	364	357°3199	2°3096
72	69°0639	0°3381	146	141°7585	1°9645	219	213°7075	1°5090	292	285°6565	1°0476	365	358°4055	2°3179

TABLE P.B.

I

Mean Places of Planets according to Indian Ephemeris at Commencement of each Century from 0 Kaliyuga.

B.C.	K.Y.	MARS.	MERCURY.	JUPITER.	VENUS.	SATURN.	RAHU.
		Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
3102	0	347.00	313.06	15.73	29.55	339.20	201.6952
3101	1	178.4072	12.8263	46.0829	254.7391	351.4239	182.3369
3001	101	238.9342	88.8443	200.8275	93.7242	133.3308	46.5103
2901	201	299.4612	134.8623	355.5721	292.7093	275.2377	270.6837
2801	301	359.9882	240.8803	150.3167	31.6944	57.1446	134.8571
2701	401	60.5152	316.8983	303.0613	330.6795	199.0515	359.0305
2601	501	121.0422	32.9163	99.8059	169.6646	340.9584	223.2039
2501	601	181.5692	108.9343	254.5505	8.6497	122.8653	87.3773
2401	701	242.0962	184.9523	9.2851	207.6348	264.7722	311.5507
2301	801	302.6232	260.9703	254.0397	46.6199	46.6791	175.7241
2201	901	5.1502	336.9883	358.7943	245.6050	188.5860	39.8975
2101	1001	63.6772	53.0063	153.5289	84.5901	330.4929	264.0709
2001	1101	122.2042	129.0243	326.2735	283.5752	112.3998	128.2443
1901	1201	184.7312	205.0423	103.0181	122.5603	352.3067	352.4177
1801	1301	245.2582	281.0603	257.7027	321.5454	36.2136	216.5911
1701	1401	305.7852	357.0783	52.5073	160.5305	178.1205	80.7645
1601	1501	6.5122	73.0963	207.2519	359.5156	320.0274	304.9379
1501	1601	66.8392	149.1143	1.9965	198.5007	101.6343	169.1113
1401	1701	127.3662	225.1323	156.7411	37.8858	243.8412	33.2247
1301	1801	187.8932	301.1503	311.4857	256.4709	25.7481	257.4581
1201	1901	248.4202	17.1683	106.2303	75.4560	167.6550	121.6315
1101	2001	308.9472	93.1863	260.9719	274.4411	309.5619	345.8049
1001	2101	9.4742	169.2043	55.7195	113.4262	91.4688	209.9783
901	2201	70.0012	245.2223	210.4041	312.4113	233.3757	74.1517
801	2301	130.5282	321.2403	5.2687	151.3964	15.2826	298.3261
701	2401	191.0552	37.2583	159.9532	350.3815	157.1895	162.4985
601	2501	251.5822	113.2763	514.6979	189.3666	299.0964	26.6719
501	2601	312.1092	189.2943	109.4425	28.3517	81.0033	250.8453
401	2701	12.6362	265.3123	264.1871	227.3368	222.9102	115.0187
301	2801	73.1632	341.3303	58.9317	66.3219	4.8171	339.1921
201	2901	133.6902	57.3483	213.6763	265.3070	146.7240	203.3655
101	3001	194.2172	133.3603	8.4209	104.2921	283.6309	67.6389
1	3101	254.7442	209.3843	163.1655	303.2772	70.5378	291.7123
A.D.							
100	3201	315.2712	285.4023	317.9101	142.2624	212.4447	155.3857
200	3301	15.7982	1.4203	112.6547	341.2475	354.3517	20.0591
300	3401	76.3252	77.4383	267.3993	180.2327	136.2586	244.2325
400	3501	136.8522	153.4563	62.1439	16.2178	278.1655	108.4059
500	3601	197.3793	229.4744	216.8885	218.2030	60.0725	332.5793
600	3701	257.9063	305.4924	11.6331	57.1832	201.9794	196.7527
700	3801	318.4333	21.5104	136.3778	256.1733	342.8864	60.9261
800	3901	18.9603	97.5284	321.1225	95.1585	125.7933	285.0995
900	4001	79.4873	173.5464	115.8671	294.1436	267.7002	149.2729
1000	4101	140.0144	249.5645	270.6117	133.1288	49.6072	13.4463
1100	4201	200.5414	325.5825	65.3563	332.1140	191.5141	237.6197
1200	4301	261.0684	41.6005	220.1009	171.0991	333.4211	101.7931
1300	4401	321.5954	117.6185	14.8455	10.0843	115.3280	325.9665
1400	4501	22.1224	193.6365	169.5901	209.0694	257.2349	190.1399
1500	4601	82.6495	269.6546	324.3347	48.0546	39.1419	54.3133
1600	4701	143.1765	345.6726	119.0793	247.0398	181.0488	278.4567
1700	4801	203.7035	61.6906	273.8239	86.0249	322.9558	142.6601
1800	4901	264.2305	137.7086	68.5685	285.0101	104.8627	6.8335
1900	5001	324.7575	213.7266	223.3130	123.9952	246.7696	231.0069
2000	5101	25.2846	289.7447	18.0576	322.9804	28.6766	95.1803

II

Mean longitude of planets at commencement of every millennium.		Mars.		Mercury.		Jupiter.		Venus.		Saturn.	
		Sūrya Siddhānta.	Indian Ephemeris.	Sūrya Siddhānta.	Indian Ephemeris.	Sūrya Siddhānta.	Indian Ephemeris.	Sūrya Siddhānta.	Indian Ephemeris.	Sūrya Siddhānta.	Indian Ephemeris.
B.C.	K.Y.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
3101	0	358.86	347.00	351.12	318.06	359.82	15.73	356.52	29.55	359.93	329.20
3101	1	190.26	178.41	45.87	12.83	30.17	46.08	221.72	254.74	12.14	351.42
2101	1001	72.90	63.68	81.97	53.01	141.84	153.53	59.72	84.59	346.22	320.49
1101	2001	315.54	308.95	117.87	93.19	253.51	260.97	257.72	274.44	326.30	309.56
101	3001	198.18	194.22	153.87	133.37	5.18	8.42	95.72	104.29	294.38	283.63
A.D.											
900	4001	80.82	79.49	189.87	173.55	116.85	115.87	293.72	294.14	268.46	267.70
1900	5001	323.46	324.76	225.87	213.73	228.52	223.31	131.72	123.99	242.54	246.77

III

The following quantities, extracted from the last Table, have to be added, or subtracted (as the case may be), in order to obtain Sūrya Siddhānta mean positions of Planets at different epochs from the standard positions deduced from the Ephemeris, Tables P.B. and F.F.

B.C.	Mars.	Mercury.	Jupiter.	Venus.	Saturn.	A.D.	Mars.	Mercury.	Jupiter.	Venus.	Saturn.
3101	+ 11.9	+ 33.0	- 15.9	- 33.0	+ 20.7	900	+ 1.3	+ 16.3	+ 1.0	- 0.4	+ 0.7
2101	+ 9.2	+ 28.9	- 11.7	- 24.9	+ 15.7						
1101	+ 6.6	+ 24.7	- 7.5	- 16.7	+ 10.7	1900	- 1.3	+ 12.1	+ 5.2	+ 7.7	- 4.5
101	+ 4.0	+ 20.5	- 3.2	- 8.6	+ 5.7						

TABLE P.B.—Mars.

Mars' mean motion for Odd Years.

Yrs.	Deg.	Yrs.	Deg.	Yrs.	Deg.
1	191.40	36	50.59	71	269.77
2	22.81	37	241.90	72	161.18
3	214.22	38	73.40	73	292.58
4	45.62	39	264.80	74	123.99
5	237.03	40	96.21	75	315.39
6	68.43	41	287.62	76	146.80
7	239.84	42	119.02	77	338.21
8	91.24	43	310.43	78	169.61
9	282.65	44	141.83	79	1.02
10	114.05	45	333.24	80	192.42
11	305.46	46	164.64	81	23.83
12	126.86	47	356.05	82	215.23
13	328.27	48	187.45	83	40.64
14	159.67	49	15.86	84	238.04
15	351.08	50	210.26	85	69.45
16	182.48	51	41.67	86	200.85
17	13.89	52	233.07	87	92.26
18	205.29	53	64.48	88	283.66
19	36.70	54	255.88	89	115.07
20	228.10	55	87.29	90	306.47
21	59.51	56	278.69	91	137.88
22	250.92	57	110.10	92	329.29
23	82.32	58	301.51	93	160.69
24	273.73	59	132.91	94	352.09
25	105.13	60	324.32	95	183.50
26	296.54	61	155.72	96	14.91
27	127.94	62	347.13	97	206.31
28	319.35	63	178.53	98	57.72
29	150.75	64	9.94	99	229.12
30	342.16	65	201.34	100	60.53
31	173.56	66	32.75		
32	4.97	67	224.15		
33	196.37	68	55.56		
34	27.77	69	246.96		
35	219.18	70	78.37		

Mars' mean motion for Days.

Days.	0	1	2	3	4	5	6	7	8	9
0	..	0.52	1.05	1.57	2.10	2.62	3.14	3.67	4.19	4.72
1	5.24	5.76	6.29	6.81	7.34	7.86	8.38	8.91	9.43	9.96
2	10.48	11.00	11.53	12.05	12.58	13.10	13.62	14.15	14.67	15.20
3	15.72	16.24	16.77	17.29	17.82	18.34	18.86	19.39	19.91	20.44
4	20.96	21.48	22.01	22.53	23.06	23.58	24.11	24.63	25.15	25.68
5	26.20	26.73	27.25	27.77	28.30	28.82	29.35	29.87	30.39	30.92
6	31.44	31.97	32.49	33.01	33.54	34.06	34.59	35.11	35.63	36.16
7	36.68	37.21	37.73	38.25	38.78	39.30	39.83	40.35	40.87	41.40
8	41.92	42.45	42.97	43.49	44.02	44.54	45.07	45.59	46.11	46.64
9	47.16	47.69	48.21	48.73	49.26	49.78	50.31	50.83	51.35	51.88
10	52.40	52.93	53.45	53.97	54.50	55.02	55.55	56.07	56.59	57.12
11	57.64	58.17	58.70	59.22	59.74	60.26	60.79	61.31	61.84	62.36
12	62.88	63.41	63.93	64.46	64.98	65.50	66.03	66.55	67.08	67.60
13	68.12	68.65	69.17	69.70	70.22	70.74	71.27	71.79	72.32	72.84
14	73.36	73.89	74.41	74.94	75.46	75.98	76.51	77.03	77.56	78.08
15	78.60	79.13	79.65	80.18	80.70	81.22	81.75	82.27	82.80	83.32
16	83.84	84.37	84.89	85.42	85.94	86.46	86.99	87.51	88.04	88.56
17	89.09	89.61	90.13	90.66	91.18	91.71	92.23	92.75	93.28	93.80
18	94.33	94.85	95.37	95.90	96.42	96.95	97.47	97.99	98.52	99.04
19	99.57	100.09	100.61	101.14	101.66	102.19	102.71	103.23	103.76	104.28
20	104.81	105.33	105.85	106.38	106.90	107.43	107.95	108.47	109.00	109.52
21	110.05	110.57	111.09	111.62	112.14	112.67	113.19	113.71	114.24	114.76
22	115.29	115.81	116.33	116.86	117.38	117.91	118.43	118.96	119.48	120.00
23	120.53	121.05	121.58	122.10	122.62	123.15	123.67	124.20	124.72	125.25
24	125.77	126.29	126.82	127.34	127.86	128.39	128.91	129.44	129.96	130.48
25	131.01	131.53	132.06	132.58	133.10	133.63	134.15	134.68	135.20	135.72
26	136.25	136.77	137.30	137.82	138.34	138.87	139.39	139.92	140.44	140.96
27	141.49	142.01	142.54	143.06	143.58	144.11	144.63	145.16	145.68	146.20
28	146.73	147.25	147.78	148.30	148.82	149.35	149.87	150.40	150.92	151.45
29	151.97	152.49	153.02	153.54	154.07	154.59	155.11	155.64	156.16	156.69
30	157.21	157.73	158.26	158.78	159.31	159.83	160.35	160.88	161.40	161.93
31	162.45	162.97	163.50	164.02	164.55	165.07	165.59	166.12	166.64	167.17
32	167.69	168.21	168.74	169.26	169.79	170.31	170.83	171.36	171.88	172.41
33	172.93	173.45	173.98	174.50	175.03	175.55	176.07	176.60	177.12	177.65
34	178.17	178.69	179.22	179.74	180.27	180.79	181.31	181.84	182.36	182.89
35	183.41	183.94	184.46	184.98	185.51	186.03	186.56	187.08	187.60	188.13
36	188.65	189.18	189.70	190.22	190.75	191.27	..	..	..	..

TABLE P.B.—Mercury.

Mercury's mean motion for Odd Years.

Yrs.	Deg.	Yrs.	Deg.	Yrs.	Deg.
1	54.76	36	171.37	71	287.98
2	109.52	37	226.13	72	342.74
3	164.28	38	280.89	73	37.50
4	219.04	39	335.65	74	92.26
5	273.80	40	390.41	75	147.02
6	328.56	41	85.17	76	201.78
7	23.32	42	139.93	77	256.54
8	78.08	43	194.69	78	311.30
9	132.84	44	249.45	79	6.06
10	187.60	45	304.21	80	60.82
11	242.36	46	358.97	81	115.58
12	297.12	47	53.73	82	170.34
13	351.88	48	108.49	83	225.10
14	46.64	49	163.25	84	279.86
15	101.40	50	218.01	85	334.62
16	156.16	51	272.78	86	29.38
17	210.92	52	327.54	87	84.14
18	265.68	53	22.30	88	138.90
19	320.44	54	77.06	89	193.67
20	15.20	55	131.82	90	248.43
21	69.96	56	186.58	91	303.19
22	124.72	57	241.34	92	357.95
23	179.48	58	296.10	93	52.71
24	234.24	59	350.86	94	107.47
25	289.00	60	45.62	95	162.23
26	343.76	61	100.38	96	216.99
27	38.52	62	155.14	97	271.75
28	93.28	63	209.90	98	326.51
29	148.04	64	264.66	99	21.27
30	202.80	65	319.42	100	76.03
31	257.57	66	14.18		
32	312.33	67	68.94		
33	7.09	68	123.70		
34	61.85	69	178.46		
35	116.61	70	233.22		

Mercury's mean motion for Days.

Days.	0	1	2	3	4	5	6	7	8	9
0	..	4.09	8.18	12.28	16.37	20.46	24.55	28.65	32.74	36.83
1	40.92	45.02	49.11	53.20	57.29	61.38	65.48	69.57	73.66	77.75
2	81.85	85.94	90.03	94.12	98.22	102.31	106.40	110.49	114.59	118.68
3	122.77	126.86	130.95	135.05	139.14	143.23	147.32	151.42	155.51	159.60
4	163.69	167.79	171.88	175.97	180.06	184.15	188.25	192.34	196.43	200.52
5	204.62	208.71	212.80	216.89	220.99	225.08	229.17	233.26	237.36	241.45
6	245.54	249.63	253.72	257.82	261.91	266.00	270.09	274.19	278.28	282.37
7	286.46	290.56	294.65	298.74	302.83	306.92	311.02	315.11	319.20	323.29
8	327.39	331.48	335.57	339.66	343.76	347.85	351.94	356.03	0.13	4.22
9	8.31	12.40	16.49	20.59	24.68	28.77	32.86	36.96	41.05	45.14
10	49.23	53.33	57.42	61.51	65.60	69.69	73.79	77.88	81.97	86.06
11	90.16	94.25	98.34	102.43	106.53	110.62	114.71	118.80	122.90	126.99
12	131.08	135.17	139.26	143.36	147.45	151.54	155.63	159.73	163.82	167.91
13	172.00	176.10	180.19	184.28	188.37	192.47	196.56	200.65	204.74	208.83
14	212.93	217.02	221.11	225.20	229.30	233.39	237.48	241.57	245.67	249.76
15	253.85	257.94	262.03	266.13	270.22	274.31	278.40	282.50	286.59	290.68
16	294.77	298.87	302.96	307.05	311.14	315.24	319.33	323.42	327.51	331.60
17	335.70	339.79	343.88	347.97	352.07	356.16	0.25	4.34	8.44	12.53
18	16.62	20.71	24.80	28.90	32.99	37.08	41.17	45.27	49.36	53.45
19	57.54	61.64	65.73	69.82	73.91	78.01	82.10	86.19	90.28	94.37
20	98.47	102.56	106.65	110.74	114.84	118.93	123.02	127.11	131.21	135.30
21	139.39	143.48	147.58	151.67	155.76	159.85	163.94	168.04	172.13	176.22
22	180.31	184.41	188.50	192.59	196.68	200.78	204.87	208.96	213.05	217.15
23	221.24	225.33	229.42	233.51	237.61	241.70	245.80	249.88	253.98	258.07
24	262.16	266.25	270.35	274.44	278.53	282.62	286.72	290.80	294.90	298.99
25	303.08	307.18	311.27	315.36	319.45	323.55	327.64	331.73	335.82	339.92
26	344.01	348.10	352.19	356.28	0.38	4.47	8.56	12.65	16.75	20.84
27	24.93	29.02	33.12	37.21	41.30	45.39	49.49	53.58	57.67	61.76
28	65.85	69.95	74.04	78.13	82.22	86.32	90.41	94.50	98.59	102.69
29	106.78	110.87	114.96	119.05	123.15	127.24	131.33	135.42	139.52	143.61</

TABLE P.B.—Jupiter.

Jupiter's mean motion for Odd Years.

Yrs.	Deg.	Yrs.	Deg.	Yrs.	Deg.
1	30.35	36	12.51	71	354.67
2	60.69	37	42.85	72	25.02
3	91.04	38	73.20	73	55.36
4	121.39	39	103.55	74	85.71
5	151.74	40	133.90	75	116.06
6	182.08	41	164.24	76	146.41
7	212.43	42	194.59	77	176.75
8	242.78	43	224.94	78	207.10
9	273.13	44	255.29	79	237.45
10	303.47	45	285.63	80	267.80
11	333.82	46	315.98	81	298.14
12	4.17	47	346.33	82	328.49
13	34.52	48	16.68	83	358.84
14	64.86	49	47.02	84	29.18
15	95.21	50	77.37	85	59.53
16	125.56	51	107.72	86	89.88
17	155.91	52	138.07	87	120.23
18	186.25	53	168.41	88	150.57
19	216.60	54	198.76	89	180.92
20	246.95	55	229.11	90	211.27
21	277.30	56	259.46	91	241.62
22	307.64	57	289.80	92	271.96
23	337.99	58	320.15	93	302.31
24	8.34	59	350.50	94	332.66
25	38.69	60	20.85	95	3.01
26	69.03	61	51.19	96	33.35
27	99.38	62	81.54	97	63.70
28	129.73	63	111.89	98	94.05
29	160.07	64	142.24	99	124.40
30	190.42	65	172.58	100	154.74
31	220.77	66	202.93		
32	251.12	67	233.28		
33	281.46	68	263.63		
34	311.81	69	293.97		
35	342.16	70	324.32		

Jupiter's mean motion for Days.

Days.	0	1	2	3	4	5	6	7	8	9
Degrees.										
0	..	0.08	0.17	0.25	0.33	0.41	0.50	0.58	0.66	0.75
1	0.83	0.91	1.00	1.08	1.16	1.24	1.33	1.41	1.50	1.58
2	1.66	1.74	1.83	1.91	1.99	2.07	2.16	2.24	2.33	2.41
3	2.49	2.58	2.66	2.74	2.82	2.91	2.99	3.07	3.16	3.24
4	3.32	3.41	3.49	3.57	3.66	3.74	3.82	3.90	3.99	4.07
5	4.15	4.24	4.32	4.40	4.49	4.57	4.65	4.74	4.82	4.90
6	4.99	5.07	5.15	5.23	5.32	5.40	5.48	5.57	5.65	5.73
7	5.82	5.90	5.98	6.07	6.15	6.23	6.31	6.40	6.48	6.56
8	6.65	6.73	6.81	6.90	6.98	7.06	7.15	7.23	7.31	7.39
9	7.48	7.56	7.64	7.73	7.81	7.89	7.98	8.06	8.14	8.23
10	8.31	8.39	8.47	8.56	8.64	8.72	8.81	8.89	8.97	9.06
11	9.14	9.22	9.31	9.39	9.47	9.55	9.64	9.72	9.80	9.89
12	9.97	10.05	10.14	10.22	10.30	10.39	10.47	10.55	10.64	10.72
13	10.80	10.88	10.97	11.05	11.13	11.22	11.30	11.38	11.47	11.55
14	11.63	11.72	11.80	11.88	11.96	12.05	12.13	12.21	12.30	12.38
15	12.46	12.55	12.63	12.71	12.80	12.88	12.96	13.04	13.13	13.21
16	13.29	13.38	13.46	13.54	13.63	13.71	13.79	13.88	13.96	14.04
17	14.13	14.21	14.29	14.37	14.46	14.54	14.62	14.71	14.79	14.87
18	14.96	15.04	15.12	15.21	15.29	15.37	15.45	15.54	15.62	15.70
19	15.79	15.87	15.95	16.04	16.12	16.20	16.29	16.37	16.45	16.53
20	16.62	16.70	16.78	16.87	16.95	17.03	17.12	17.20	17.28	17.37
21	17.45	17.53	17.61	17.70	17.78	17.86	17.95	18.03	18.11	18.20
22	18.28	18.36	18.45	18.53	18.61	18.70	18.78	18.86	18.94	19.03
23	19.11	19.19	19.28	19.36	19.44	19.53	19.61	19.69	19.78	19.86
24	19.94	20.02	20.11	20.19	20.27	20.36	20.44	20.52	20.61	20.69
25	20.77	20.86	20.94	21.02	21.11	21.19	21.27	21.35	21.44	21.52
26	21.60	21.69	21.77	21.85	21.94	22.02	22.10	22.18	22.27	22.35
27	22.43	22.52	22.60	22.68	22.77	22.85	22.93	23.02	23.10	23.18
28	23.27	23.35	23.43	23.51	23.60	23.68	23.76	23.85	23.93	24.01
29	24.10	24.18	24.26	24.35	24.43	24.51	24.59	24.68	24.76	24.84
30	24.93	25.01	25.09	25.18	25.26	25.34	25.43	25.51	25.59	25.67
31	25.76	25.84	25.92	26.01	26.09	26.17	26.26	26.34	26.42	26.51
32	26.59	26.67	26.75	26.84	26.92	27.01	27.09	27.17	27.25	27.34
33	27.42	27.50	27.59	27.67	27.75	27.84	27.92	28.00	28.08	28.17
34	28.25	28.33	28.42	28.50	28.58	28.67	28.75	28.83	28.92	29.00
35	29.08	29.16	29.25	29.33	29.41	29.50	29.58	29.66	29.75	29.83
36	29.91	30.00	30.08	30.16	30.24	30.33	..	..	..	..

TABLE P.B.—Venus.

Venus' mean motion for Odd Years.

Yrs.	Deg.	Yrs.	Deg.	Yrs.	Deg.
1	225.19	36	186.83	71	148.48
2	90.38	37	52.02	72	13.67
3	151.57	38	277.21	73	238.86
4	180.76	39	112.40	74	104.05
5	45.95	40	7.59	75	329.24
6	271.14	41	232.78	76	194.43
7	136.33	42	97.97	77	59.62
8	1.52	43	323.16	78	284.81
9	226.71	44	188.35	79	150.00
10	91.90	45	53.54	80	15.19
11	317.09	46	278.73	81	240.38
12	182.28	47	143.92	82	105.57
13	47.47	48	9.11	83	330.76
14	272.66	49	234.30	84	195.95
15	137.85	50	99.49	85	61.14
16	3.04	51	321.68	86	286.33
17	228.23	52	189.87	87	151.52
18	93.42	53	55.06	88	16.71
19	318.61	54	280.25	89	241.90
20	183.80	55	145.44	90	107.09
21	48.99	56	10.63	91	332.28
22	274.18	57	235.82	92	197.47
23	139.37	58	101.01	93	62.66
24	4.56	59	326.20	94	287.85
25	229.75	60	191.39	95	153.04
26	94.94	61	56.58	96	18.23
27	320.13	62	281.77	97	243.42
28	185.32	63	146.96	98	108.60
29	50.51	64	12.15	99	333.79
30	275.70	65	237.34	100	198.98
31	140.88	66	102.53		
32	6.07	67	327.72		
33	231.26	68	192.91		
34	96.45	69	58.10		
35	321.64	70	283.29		

Venus' mean motion for Days.

Days.	0	1	2	3	4	5	6	7	8	9
Degrees.										
0	..	1.60	3.20	4.81	6.41	8.01	9.61	11.21	12.82	14.42
1	16.02	17.62	19.23	20.83	22.43	24.03	25.63	27.24	28.84	30.44
2	32.04	33.64	35.25	36.85	38.45	40.05	41.65	43.26	44.86	46.46
3	48.06	49.66	51.27	52.87	54.47	56.07	57.68	59.28	60.88	62.48
4	64.08	65.68	67.29	68.89	70.49	72.09	73.70	75.30	76.90	78.50
5	80.11	81.71	83.31	84.91	86.51	88.12	89.72	91.32	92.92	94.53
6	96.13	97.73	99.33	100.93	102.54	104.14	105.74	107.34	108.94	110.55
7	112.15	113.75	115.35	116.95	118.56	120.16	121.76	123.36	124.97	126.57
8	128.17	129.77	131.37	132.98	134.58	136.18	137.78	139.38	140.99	142.59
9	144.19	145.79	147.40	149.00	150.60	152.20	153.80	155.41	157.01	158.61
10	160.21	161.81	163.42	165.02	166.62	168.22	169.83	171.43	173.03	174.63
11	176.23	177.84	179.44	181.04	182.64	184.24	185.85	187.45	189.05	190.65
12	192.25	193.86	195.46	197.06	198.66	200.27	201.87	203.47	205.07	206.67
13	208.28	209.88	211.48	213.08	214.69	216.29	217.89	219.49	221.09	222.70
14	224.30	225.90	227.50	229.10	230.71	232.31	233.91	235.51	237.11	238.72
15	240.32	241.92	243.52	245.13	246.73	248.33	249.93	251.53	253.14	254.74
16	256.34	257.94	259.54	261.15	262.75	264.35	265.95	267.56	269.16	270.76
17	272.36	273.96	275.57	277.17	278.77	280.37	281.97	283.58	285.18	286.78
18	288.38	289.98	291.59	293.19	294.79	296.39	297.99	299.60	301.20	302.80
19	304.40	306.01	307.61	309.21	310.81	312.41	314.02	315.62	317.22	318.82
20	320.43	322.03	323.63	325.23	326.83	328.44	330.04	331.64	333.24	334.84
21	336.45	338.05	339.65	341.25	342.86	344.46	346.06	347.66	349.26	350.87
22	352.47	354.07	355.67	357.27	358.88	0.48	2.08	3.68	5.29	6.89
23	8.49	10.09	11.69	13.30	14.90	16.50	18.10	19.70	21.31	22.91
24	24.51	26.11	27.72	29.32	30.92	32.52	34.12	35.73	37.33	38.93
25	40.53	42.13	43.74	45.34	46.94	48.54	50.15	51.75	53.35	54.95
26	56.55	58.15	59.76	61.36	62.96	64.56	66.17	67.77	69.37	70.97
27	72.57	74.17	75.78	77.38	78.98	80.59	82.19	83.79	85.39	86.99
28	88.60	90.20	91.80	93.40	95.00	96.61	98.21	99.81	101.41	103.02
29	104.62	106.22	107.82	109.42	111.03	112.63	114.23	115.83	117.43	119.04
30	120.64	122.24	123.84	125.45	127.05	128.65	130.25	131.85	133.46	135.

TABLE P.B.—Saturn.

Saturn's mean motion for Odd Years.

Yrs.	Deg.	Yrs.	Deg.	Yrs.	Deg.
1	12.22	36	79.89	71	147.55
2	24.44	37	92.10	72	159.77
3	36.66	38	104.32	73	171.99
4	48.88	39	116.54	74	184.21
5	61.09	40	128.76	75	196.43
6	73.31	41	140.98	76	208.65
7	85.53	42	153.20	77	220.87
8	97.75	43	165.42	78	233.09
9	109.97	44	177.64	79	245.31
10	122.19	45	189.86	80	257.52
11	134.41	46	202.08	81	269.74
12	146.63	47	214.30	82	281.96
13	158.85	48	226.51	83	294.18
14	171.07	49	238.73	84	306.40
15	183.29	50	250.95	85	318.62
16	195.50	51	263.17	86	330.84
17	207.72	52	275.39	87	343.06
18	219.94	53	287.61	88	355.28
19	232.16	54	299.83	89	7.50
20	244.38	55	312.05	90	19.72
21	256.60	56	324.27	91	31.93
22	268.82	57	336.49	92	44.15
23	281.04	58	348.71	93	56.37
24	293.26	59	0.92	94	68.59
25	305.48	60	13.14	95	80.81
26	317.70	61	25.36	96	93.03
27	329.91	62	37.58	97	105.25
28	342.13	63	49.80	98	117.47
29	354.35	64	62.02	99	129.69
30	6.57	65	74.24	100	141.91
31	18.79	66	86.46		
32	31.01	67	98.68		
33	43.23	68	110.90		
34	55.45	69	123.12		
35	67.67	70	135.33		

Saturn's mean motion for Days.

Days.	0	1	2	3	4	5	6	7	8	9
0	..	0.03	0.07	0.10	0.13	0.17	0.20	0.23	0.27	0.30
1	0.33	0.37	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.64
2	0.67	0.70	0.74	0.77	0.80	0.84	0.87	0.90	0.94	0.97
3	1.00	1.04	1.07	1.10	1.14	1.17	1.20	1.24	1.27	1.30
4	1.34	1.37	1.40	1.44	1.47	1.51	1.54	1.57	1.61	1.64
5	1.67	1.71	1.74	1.77	1.81	1.84	1.87	1.91	1.94	1.97
6	2.01	2.04	2.07	2.11	2.14	2.17	2.21	2.24	2.27	2.31
7	2.34	2.38	2.41	2.44	2.48	2.51	2.54	2.58	2.61	2.64
8	2.68	2.71	2.74	2.78	2.81	2.84	2.88	2.91	2.94	2.98
9	3.01	3.04	3.08	3.11	3.14	3.18	3.21	3.25	3.28	3.31
10	3.35	3.38	3.41	3.45	3.48	3.51	3.55	3.58	3.61	3.65
11	3.68	3.71	3.75	3.78	3.81	3.85	3.88	3.91	3.95	3.98
12	4.01	4.05	4.08	4.12	4.15	4.18	4.22	4.25	4.28	4.32
13	4.35	4.38	4.42	4.45	4.48	4.52	4.55	4.58	4.62	4.65
14	4.68	4.72	4.75	4.78	4.82	4.85	4.88	4.92	4.95	4.99
15	5.02	5.05	5.09	5.12	5.15	5.19	5.22	5.25	5.29	5.32
16	5.35	5.39	5.42	5.45	5.49	5.52	5.55	5.59	5.62	5.65
17	5.69	5.72	5.75	5.79	5.82	5.85	5.89	5.92	5.96	5.99
18	6.02	6.06	6.09	6.12	6.16	6.19	6.22	6.26	6.29	6.32
19	6.36	6.39	6.42	6.46	6.49	6.52	6.56	6.59	6.62	6.66
20	6.69	6.72	6.76	6.79	6.83	6.86	6.89	6.93	6.96	6.99
21	7.08	7.06	7.09	7.13	7.16	7.19	7.23	7.26	7.29	7.33
22	7.36	7.39	7.43	7.46	7.49	7.53	7.56	7.59	7.63	7.66
23	7.70	7.73	7.76	7.80	7.83	7.86	7.90	7.93	7.96	8.00
24	8.03	8.06	8.10	8.13	8.16	8.20	8.23	8.26	8.29	8.33
25	8.36	8.40	8.43	8.46	8.50	8.53	8.57	8.60	8.63	8.67
26	8.70	8.73	8.77	8.80	8.83	8.87	8.90	8.93	8.97	9.00
27	9.03	9.07	9.10	9.13	9.17	9.20	9.23	9.27	9.30	9.33
28	9.37	9.40	9.43	9.47	9.50	9.54	9.57	9.60	9.64	9.67
29	9.70	9.74	9.77	9.80	9.84	9.87	9.90	9.94	9.97	10.00
30	10.04	10.07	10.10	10.14	10.17	10.20	10.24	10.27	10.31	10.34
31	10.37	10.41	10.44	10.47	10.51	10.54	10.57	10.61	10.64	10.67
32	10.71	10.74	10.77	10.81	10.84	10.87	10.91	10.94	10.97	11.01
33	11.04	11.07	11.11	11.14	11.18	11.21	11.24	11.28	11.31	11.34
34	11.38	11.41	11.44	11.48	11.51	11.54	11.58	11.61	11.64	11.68
35	11.71	11.74	11.78	11.81	11.84	11.88	11.91	11.94	11.98	12.01
36	12.05	12.08	12.11	12.15	12.18	12.21	..	..	..	..

TABLE P.B.—Rahu.

Mean motion of Rahu in sidereal longitude (Indian) for Odd Years of a century and for multiples of 100 years.

Years.	Degrees.	Years.	Degrees.	Years.	Degrees.	Years.	Degrees.	Years.	Degrees.
1	19.3583	24	104.5992	47	189.8401	70	275.0810	93	0.3219
2	38.7166	25	123.9575	48	209.1984	71	294.4393	94	19.6802
3	58.0749	26	143.3158	49	228.5567	72	313.7976	95	39.0385
4	77.4332	27	162.6741	50	247.9150	73	333.1559	96	58.3968
5	96.7915	28	182.0324	51	267.2733	74	352.5142	97	77.7551
6	116.1498	29	201.3907	52	286.6316	75	11.8725	98	97.1134
7	135.5081	30	220.7500	53	305.9899	76	31.2308	99	116.4717
8	154.8664	31	240.1073	54	325.3482	77	50.5891	100	135.8299
9	174.2247	32	259.4656	55	344.7065	78	69.9474	200	271.6599
10	193.5830	33	278.8239	56	4.0648	79	89.3057	300	47.4898
11	212.9413	34	298.1822	57	23.4231	80	108.6640	400	183.3198
12	232.2996	35	317.5405	58	42.7814	81	128.0223	500	319.1491
13	251.6579	36	336.8988	59	62.1397	82	147.3806	600	94.9797
14	271.0162	37	356.2571	60	81.4980	83	166.7389	700	230.8096
15	290.3745	38	15.6154	61	100.8563	84	186.0972	800	6.6396
16	309.7328	39	34.9737	62	120.2146	85	205.4555	900	142.4695
17	329.0911	40	54.3320	63	139.5729	86	224.8138	1000	278.2995
18	348.4494	41	73.6903	64	158.9312	87	244.1721	2000	296.5990
19	7.8077	42	93.0486	65	178.2895	88	263.5304	3000	114.8985
20	27.1660	43	112.4069	66	197.6478	89	282.8887	4000	33.1980
21	46.5243	44	131.7652	67	217.0061	90	302.2470	5000	311.4975
22	65.8826	45	151.1235	68	236.3644	91	321.6053	6000	229.7970
23	85.2409	46	170.4818	69	255.7227	92	340.9636	10000	262.0950

N.B.—Rahu's motion is backward, not forward. Therefore, in deducing the place of Rahu for so many years or so many days (see below) subsequent to a given moment, the motion of Rahu for the required interval should be deducted from, (not added to), the given place. Thus: required to deduce from the place of Rahu at 0 Kaliyuga his place one day after Mēsha Sankrānti, A.D. 1909. From the given place, 201.6852° deduct motion for 5010 years and one day, i.e., 5000 years (311.4975°) + 10 years (193.5830°) + 1 day (0.530°). Result 50.5617°.

Mean motion of Rahu for every ten days and for fractions of a day.

Day.	Degrees.	Days.	Degrees.	Days.	Degrees.	Days.	Degrees.	Days.	Degrees.	Days.	Degrees.
1	0.053	1	0.530	10	5.300	100	5.2999	190	10.0698	280	14.8397
2	0.106	2	1.060	20	1.0600	110	5.8299	200	10.5998	290	15.3696
3	0.159	3	1.590	30	1.5900	120	6.3599	210	11.1297	300	15.8996
4	0.212	4	2.120	40	2.1199	130	6.8899	220	11.6597	310	16.4296
5	0.265	5	2.650	50	2.6499	140	7.4199	230	12.1897	320	16.9516
6	0.318	6	3.180	60	3.1799	150	7.9499	240	12.7197	330	17.4894
7	0.371	7	3.710	70	3.7099	160	8.4798	250	13.2497	340	18.0196
8	0.424	8	4.240	80	4.2399	170	9.0098	260	13.7797	350	18.5496
9	0.477	9	4.770	90	4.7699	180	9.5398	270	14.3097	360	19.0796



TABLE P.C. - Cyclic Variations.

N.B. The signs given below are for forward cycles. For cycles reckoned backwards reverse the sign + or -]

Period forward years.	Cyclic variation.	Analysis of period.	Mars.	Analysis of cyclic variation.
	Degrees.	Year		Degrees.
1	+ 191.405253			
79	+ 1.014987			
284	- .908			
363	+ .107944	284 + 79	 + 1.015 - .908 = + .107944	
2099	- .37	6 x 363 - 79	2178 - 79 .. + .64 - 1.01 = - .37	
2462	- .26	7 x 363 - 79	2541 - 79 .. + .75 - 1.01 = - .266; or - .27	
3551	+ .055	10 x 363 - 79	3630 - 79 .. + 1.070 - 1.015 = + .055	
3914	+ .162	3551 + 363 or 3630 + 284	.. + .055 + .107; or 1.070 - .908 = + .162	
4277	+ .27	3914 + 363	 + 162 + .107 = + .269, or + .27	
6739	+ .003	4277 + 2462	 + .269 - .266 = + .003	

N.B. 726, 1089, 1452, 1815, 2178, 2541, 2904, 3267 years are multiples of 363.

Mercury.

1	+ 54.7603			
46	- 1.0259			
263	+ .996			
309	- 0.9314			
355	- 0.09150			
2439	- 0.3854	6 x 355 + 309	 + .9344 - .5490 = + .3854	
3859	- 0.0194	10 x 355 + 309	 - .9150 + .9344 = - .0194	
4214	- 0.0721	12 x 355 - 46	 - 1.0980 + 1.0259 = - .0721	

N.B. 710, 1065, 1420, 1775, 2130, 2485, 2840, 3195, 3550, 3905, 4260 are multiples of 355

Jupiter.

1	- 30.317			
12	+ 1.1692			
83	- 1.1630			
95	+ 3.0062	83 + 12 - 95	 + 4.1692 - 1.1630 = + 3.0062	
178	+ 1.8431	95 + 83	 + 3.0062 - 1.1630 = + 1.8432	
261	+ .68009	178 + 83	 + 1.8431 - 1.1630 = + 0.6801	
344	- .48294	261 + 83; or 4 x 83 + 12	 + .68009 - 1.16304 = - .48295	
605	+ .19714	344 + 261; or 7 x 83 + 24	 + .68009 - .48294 = + .19715	
949	- .28580	605 + 344	 + .19714 - .48294 = - .28580	

N.B.—1210, 1815, 2420, 3025, 3630 years are multiples of 605 years.

1554	- .08865	1210 + 344	 + .39428 - .48294 = - .08866	
1898	- .5716	1815 + 83, or 3 x 605 + 83	 + .59142 - 1.1630 = - .5716	
2159	+ .1085	1898 + 261	 - .5716 + .6801 = + .1085	
2503	- .3744	4 x 605 + 83	 + .78856 - 1.1630 = - .3744	
2764	+ .3056	4 x 605 + 344	 + .78856 - .48294 = + .30562	
3108	- .17732	2 x 1554	 - .17732	
3452	- .66026	2 x 1554 + 344	 - .17732 - .48294 = - .66026	
3713	+ .01983	3452 + 261	 - .66026 + .68009 = + .01983	
4057	- .46311	3713 + 344	 + .01983 - .48294 = - .46311	
4318	+ .21694	3 x 1554 - 344	 - .26000 + .48294 = + .21694	

Venus.

1	+ 225.189801			
8	+ 1.518648			
235	- .3897			
470	- .78	2 x 235	 2 x .3897 = .7794	
478	+ .74	2 x 235 + 8	 - .7794 + 1.5186 = + .7392	
713	+ .3485	3 x 235 + 8	 - 1.1691 + 1.5186 = + .3485	
948	- .0402	4 x 235 + 8	 - 1.5588 + 1.5186 = - .0402	
1418	- .8196	6 x 235 + 8	 - 2.3382 + 1.5186 = - .8196	
1426	+ .6990	6 x 235 + 2 x 8	 - 2.3382 + 3.0372 = + .6990	
1896	- .0804	2 x 948	 - .0804	
2131	- .4701	2 x 948 + 235	 - .0804 - .3897 = - .4701	
2374	+ .6588	2 x 948 + 478	 - .0804 + .7392 = + .6588	
2844	- .1206	3 x 948	 - 1.206	
3792	- .1608	4 x 948	 - 1.608	
4740	- .2010	5 x 948	 - 2.010	

N.B.—1896, 2844, 3792, 4740, 5688 years are multiples of 948 years.

Saturn.

1	+ 12.2191001	
59	+ .926906	
265	- 1.938474	
324	- 1.011568	
383	- .084653	

Note.—766, 1149, 1532, 1915, 2298, 2681, 3064, 3447, 3830, 4213 are multiples of 383.

2357	+ .4187	6 x 383 + 59	 - .5082 + .9269 = + .4187	
2740	+ .3340	7 x 383 + 59	 - .5929 + .9269 = + .3340	
3123	+ .2493	8 x 383 + 59	 - .6776 + .9269 = + .2493	
3506	+ .1646	9 x 383 + 59	 - .7623 + .9269 = + .1646	
3889	+ .0803	10 x 383 + 59	 - .8466 + .9269 = + .0803	
4272	- .0048	11 x 383 + 59	 - .9317 + .9269 = - .0048	

TABLE P.D.—Planetary decursus for every tenth day in certain basic years Mars, Jupiter and Saturn.

			DAYS OF SOLAR YEAR.																		
			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	
			Mean Longitude in Degrees.																		
B.C.	3201	Mars	117.9	123.1	128.4	133.6	138.9	144.1	149.3	154.6	159.8	165.1	170.3	175.5	180.8	186.0	191.3	196.5	201.7	207.0	
Jupiter		251.3	252.1	253.0	253.8	254.6	255.5	256.3	257.1	257.9	258.8	259.6	260.4	261.3	262.1	262.9	263.8	264.6	265.4		
Saturn		209.5	209.8	210.2	210.5	210.8	211.2	211.5	211.8	212.2	212.5	212.8	213.2	213.5	213.8	214.2	214.5	214.8	215.2		
B.C.	3102	Mars	347.0	352.2	357.5	2.7	7.9	13.2	18.4	23.7	29.0	34.2	39.4	44.6	49.9	55.1	60.3	65.6	70.8	76.1	
Jupiter		15.7	16.5	17.4	18.2	19.0	19.8	20.7	21.5	22.3	23.2	24.0	24.8	25.7	26.5	27.3	28.2	29.0	29.8		
Saturn		339.2	339.5	339.9	340.2	340.5	340.9	341.2	341.5	341.9	342.2	342.5	342.9	343.2	343.5	343.9	344.2	344.5	344.9		
P.C.	2601	Mars	121.0	126.2	131.5	136.8	142.0	147.2	152.4	157.7	163.0	168.2	173.4	178.7	183.9	189.2	194.4	199.6	204.9	210.1	
Jupiter		99.8	100.6	101.5	102.3	103.1	104.0	104.8	105.6	106.5	107.3	108.1	108.9	109.8	110.6	111.4	112.3	113.1	113.9		
Saturn		341.0	341.3	341.6	342.0	342.3	342.6	343.0	343.3	343.6	344.0	344.3	344.6	345.0	345.3	345.6	346.0	346.3	346.6		
B.C.	2101	Mars	63.7	68.0	72.2	76.4	80.7	84.9	89.2	93.5	97.8	102.1	106.4	110.7	115.0	119.3	123.6	127.9	132.2	136.5	
Jupiter		153.5	154.3	155.2	156.0	156.8	157.6	158.5	159.3	160.1	161.0	161.8	162.6	163.5	164.3	165.1	166.0	166.8	167.6		
Saturn		330.5	330.8	331.2	331.5	331.8	332.2	332.5	332.8	333.2	333.5	333.8	334.2	334.5	334.8	335.2	335.5	335.8	336.2		
B.C.	1601	Mars	6.3	11.5	16.8	22.0	27.3	32.5	37.7	43.0	48.2	53.5	58.7	64.0	69.2	74.4	79.7	84.9	90.2	95.4	
Jupiter		207.2	208.1	208.9	209.7	210.6	211.4	212.2	213.0	213.8	214.7	215.6	216.4	217.2	218.1	218.9	219.7	220.5	221.4		
Saturn		320.0	320.4	320.7	321.0	321.4	321.7	322.0	322.4	322.7	323.0	323.4	323.7	324.0	324.4	324.7	325.0	325.4	325.7		
B.C.	1101	Mars	308.9	314.1	319.4	324.6	329.9	335.1	340.3	345.6	350.8	356.1	1.3	6.5	11.8	17.0	22.3	27.5	32.7	38.0	
Jupiter		261.0	261.8	262.7	263.5	264.3	265.1	266.0	266.8	267.6	268.5	269.3	270.1	271.0	271.8	272.6	273.5	274.3	275.1		
Saturn		309.6	309.8	310.3	310.6	310.9	311.3	311.6	311.9	312.3	312.6	312.9	313.3	313.6	313.9	314.3	314.6	314.9	315.3		
B.C.	601	Mars	251.6	256.8	262.1	267.3	272.5	277.8	283.0	288.3	293.5	298.7	304.0	309.2	314.5	319.7	325.0	330.2	335.4	340.7	
Jupiter		314.7	315.5	316.4	317.2	318.0	318.9	319.7	320.5	321.3	322.2	323.0	323.8	324.7	325.5	326.3	327.2	328.0	328.8		
Saturn		299.1	299.4	299.8	300.1	300.4	300.8	301.1	301.4	301.8	302.1	302.4	302.8	303.1	303.4	303.8	304.1	304.4	304.8		
B.C.	101	Mars	194.2	199.4	204.7	209.9	215.2	220.4	225.6	230.9	236.1	241.4	246.6	251.8	257.1	262.3	267.6	272.8	278.0	283.3	
Jupiter		8.4	9.2	10.1	10.9	11.7	12.5	13.4	14.2	15.0	15.9	16.7	17.5	18.4	19.2	20.0	20.9	21.7	22.5		
Saturn		288.6	288.9	289.3	289.6	289.9	290.3	290.6	290.9	291.3	291.6	291.9	292.3	292.6	292.9	293.3	293.6	293.9	294.3		
B.C.	1	Mars	254.7	259.9	265.2	270.4	275.7	280.9	286.1	291.4	296.6	301.9	307.1	312.3	317.6	322.8	328.1	333.3	338.5	343.8	
Jupiter		163.2	164.0	164.9	165.7	166.5	167.3	168.2	169.0	169.8	170.7	171.5	172.3	173.2	174.0	174.8	175.7	176.5	177.3		
Saturn		70.5	70.8	71.2	71.5	71.8	72.2	72.5	72.8	73.2	73.5	73.8	74.2	74.5	74.8	75.2	75.5	75.8	76.2		
A.D.	500	Mars	197.4	202.6	207.9	213.1	218.3	223.6	228.8	234.1	239.3	244.5	249.8	255.0	260.3	265.5	270.7	276.0	281.2	286.5	
Jupiter		216.9	217.7	218.6	219.4	220.2	221.0	221.9	222.7	223.5	224.4	225.2	226.0	226.9	227.7	228.5	229.4	230.2	231.0		
Saturn		60.1	60.4	60.7	61.1	61.4	61.7	62.1	62.4	62.7	63.1	63.4	63.8	64.1	64.4	64.8	65.1	65.4	65.8		
A.D.	1000	Mars	140.0	145.2	150.5	155.7	161.0	166.2	171.4	176.7	181.9	187.2	192.4	197.6	202.9	208.1	213.4	218.6	223.8	229.1	
Jupiter		270.6	271.4	272.3	273.1	273.9	274.8	275.6	276.4	277.2	278.1	278.9	279.7	280.6	281.4	282.2	283.1	283.9	284.7		
Saturn		49.6	49.9	50.3	50.6	50.9	51.3	51.6	51.9	52.3	52.6	52.9	53.3	53.6	53.9	54.3	54.6	54.9	55.3		
A.D.	1500	Mars	82.6	87.9	93.1	98.4	103.6	108.9	114.1	119.3	124.6	129.8	135.1	140.3	145.5	150.8	156.0	161.3	166.5	171.7	
Jupiter		324.3	325.2	326.0	326.8	327.7	328.5	329.3	330.2	331.0	331.8	332.6	333.5	334.3	335.1	336.0	336.8	337.6	338.5		
Saturn		39.1	39.5	39.8	40.1	40.5	40.8	41.1	41.5	41.8	42.2	42.5	42.8	43.2	43.5	43.8	44.2	44.5	44.8		
			DAYS OF SOLAR YEAR.																		
			180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
			Mean Longitude in Degrees.																		
B.C.	3201	Mars	212.2	217.5	222.7	228.0	233.2	238.4	243.7	249.0	254.2	259.4	264.7	269.9	275.1	280.3	285.6	290.8	296.1	301.3	306.5
Jupiter		266.3	267.1	267.9	268.7	269.6	270.4	271.2	272.1	272.9	273.7	274.6	275.4	276.2	277.1	277.9	278.7	279.5	280.4	281.2	
Saturn		215.5	215.8	216.2	216.5	216.8	217.2	217.5	217.8	218.2	218.5	218.8	219.2	219.5	219.8	220.2	220.5	220.8	221.2	221.5	
B.C.	3102	Mars	81.3	86.5	91.8	97.0	102.3	107.5	112.7	118.0	123.2	128.5	133.7	139.0	144.2	149.4	154.7	160.0	165.2	170.4	175.6
Jupiter		30.7	31.5	32.3	33.1	34.0	34.8	35.6	36.5	37.3	38.1	39.0	39.8	40.6	41.5	42.3	43.1	43.9	44.8	45.6	
Saturn		345.2	345.5	345.9	346.2	346.5	346.9	347.2	347.5	347.9	348.2	348.5	348.9	349.2	349.5	349.9	350.2	350.5	350.9	351.2	
B.C.	2601	Mars	215.4	220.6	225.8	231.1	236.3	241.6	246.8	252.0	257.3	262.5	267.8	273.0	278.2	283.5	288.7	294.0	299.2	304.4	309.7
Jupiter		114.8	115.6	116.4	117.3	118.1	118.9	119.7	120.6	121.4	122.2	123.1	123.9	124.7	125.6	126.4	127.2	128.1	128.9	129.7	
Saturn		347.0	347.3	347.6	348.0	348.3	348.7	349.0	349.3	349.7	350.0	350.3	350.7	351.0	351.3	351.7	352.0	352.3	352.7	353.0	
B.C.	2101	Mars	158.0	163.3	168.5	173.7	179.0	184.2	189.5	194.7	199.9	205.2	210.4	215.7	221.0	226.2	231.5	236.8	242.0	247.1	252.3
Jupiter		168.5	169.3	170.1	170.9	171.8	172.6	173.4	174.3	175.1	175.9	176.8	177.6	178.4	179.3	180.1	180.9	181.7	182.6	183.4	
Saturn		336.5	336.8	337.2	337.5	337.8	338.2	338.5	338.8	339.2	339.5	339.8	340.2	340.5	340.8	341.2	341.5	341.8	342.2	342.5	
B.C.	1601	Mars	100.6	105.9	111.1	116.4	121.6	126.8	132.1	137.3	142.6	147.8	153.0	158.3	163.5	168.8	174.0	179.2	184.5	189.7	195.0
Jupiter		222.2	223.0	223.9	224.7	225.5	226.4	227.2	228.0	228.9	229.7	230.5	231.3	232.2	233.0	233.8	234.7	235.5	236.3	237.2	
Saturn		326.0	326.4	326.7	327.1	327.4	327.7	328.1	328.4	328.7	329.1	329.4	329.7	330.0	330.3	330.7	331.1	331.4	331.7	332.1	
B.C.	1101	Mars	43.2	48.5	53.7	58.9	64.2	69.4	74.7	79.9	85.1	90.4	95.6	100.9	106.1	111.3	116.6	121.8	127.1	132.3	137.5
Jupiter		276.0	276.8	277.6	278.4	279.3	280.1	280.9	281.8	282.6	283.4	284.3	285.1	285.9	286.8	287.6	288.4	289.2	290.0	290.9	
Saturn		315.6	315.9	316.3	316.6	316.9	317.3	317.6	317.9	318.3	318.6	318.9	319.3	319.6	319.9	320.3	320.6	320.9	321.3	321.6	
B.C.	601	Mars	346.0	351.2	356.4	1.6	6.9	12.1	17.3	22.6	27.8	33.1	38.3	43.6	48.8	54.0	59.3	64.5	69.8	75.0	80.2
Jupiter		329.7	330.5	331.3	332.1	333.0	333.8	334.6	335.5	336.3	337.1	338.0	338.8	339.6	340.5	341.3	342.1	342.9	343.8	344.6	
Saturn		305.1	305.5	305.8	306.1	306.5	306.8	307.1	307.5	307.8	308.1	308.5	308.8	309.1	309.5	309.8	310.1	310.5	310.8	311.1	
B.C.	101	Mars	258.5	263.8	269.0	274.2	279.5														

TABLE P.D.—Planetary decursus for every tenth day in certain basic years—Mercury, Venus and Rahu.

			DAYS OF SOLAR YEAR.																		
			0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	
			Mean Longitude in degrees.																		
B.C. 3201	Mercury	296.8	337.7	18.7	59.6	100.5	141.4	182.3	223.3	264.2	305.1	346.0	27.0	67.9	108.8	149.7	190.7	231.6	272.5		
	Venus	55.8	71.8	87.8	103.9	119.9	135.9	151.9	167.9	184.0	200.0	216.0	232.0	248.1	264.1	280.1	296.1	312.1	328.2		
	Rahu	318.2	317.7	317.1	316.6	316.1	315.6	315.0	314.5	314.0	313.4	312.9	312.4	311.8	311.3	310.8	310.3	309.7	309.2		
B.C. 3102	Mercury	318.1	359.0	40.0	80.9	121.8	162.7	203.6	244.6	285.5	326.4	7.3	48.3	89.2	130.1	171.0	212.0	252.9	293.8		
	Venus	29.6	45.6	61.6	77.7	93.7	109.7	125.7	141.8	157.8	173.8	189.8	205.8	221.9	237.9	253.9	269.9	285.9	302.0		
	Rahu	201.7	201.2	200.6	200.1	199.6	199.1	198.5	198.0	197.5	197.0	196.4	195.9	195.4	194.8	194.3	193.8	193.2	192.7		
B.C. 2601	Mercury	32.9	73.8	114.8	155.7	196.6	237.5	278.4	319.4	0.3	41.2	82.1	123.1	164.0	204.9	245.8	286.7	327.7	8.6		
	Venus	169.7	185.7	201.7	217.8	233.8	249.8	265.8	281.9	297.9	313.9	329.9	345.9	2.0	18.0	34.0	50.0	66.0	82.1		
	Rahu	223.2	222.7	222.2	221.6	221.1	220.6	220.0	219.5	219.0	218.4	217.9	217.4	216.8	216.3	215.8	215.3	214.7	214.2		
B.C. 2101	Mercury	53.0	93.9	134.9	175.8	216.7	257.6	298.5	339.5	20.4	61.3	102.2	143.2	184.1	225.0	265.9	306.9	347.8	28.7		
	Venus	84.6	100.6	116.6	132.7	148.7	164.7	180.7	196.8	212.8	228.8	244.8	260.8	276.9	292.9	308.9	324.9	340.9	357.0		
	Rahu	264.1	263.6	263.0	262.5	262.0	261.5	260.9	260.4	259.9	259.3	258.8	258.3	257.7	257.2	256.7	256.2	255.6	255.1		
B.C. 1601	Mercury	73.1	114.0	155.0	195.9	236.8	277.7	318.6	359.5	40.5	81.4	122.3	163.3	204.2	245.1	286.0	327.0	7.9	48.8		
	Venus	359.5	15.5	31.5	47.6	63.6	79.6	95.6	111.7	127.7	143.7	159.7	175.7	191.8	207.8	223.8	239.8	255.8	271.9		
	Rahu	304.9	304.4	303.8	303.3	302.8	302.3	301.7	301.2	300.7	300.1	299.6	299.1	298.5	298.0	297.5	297.0	296.4	295.9		
B.C. 1101	Mercury	93.2	134.1	175.1	216.0	256.9	297.8	338.7	379.7	19.7	60.6	101.5	142.4	183.4	224.3	265.2	306.1	347.1	28.0	68.9	
	Venus	274.4	290.4	306.4	322.5	338.5	354.5	10.5	26.6	42.6	58.6	74.6	90.6	106.7	122.7	138.7	154.7	170.7	186.8		
	Rahu	345.8	345.3	344.7	344.2	343.7	343.2	342.6	342.1	341.6	341.0	340.5	340.0	339.4	338.9	338.4	337.9	337.3	336.8		
B.C. 601	Mercury	113.3	154.2	195.2	236.1	277.0	317.9	358.8	39.8	80.7	121.6	162.5	203.5	244.4	285.3	326.2	7.2	48.1	89.0		
	Venus	189.4	205.4	221.4	237.5	253.5	269.5	285.5	301.6	317.6	333.6	349.6	5.6	21.7	37.7	53.7	69.7	85.7	101.8		
	Rahu	26.7	26.2	25.6	25.1	24.6	24.1	23.5	23.0	22.5	21.9	21.4	20.9	20.3	19.8	19.3	18.8	18.2	17.7		
B.C. 101	Mercury	133.4	174.3	215.3	256.2	297.1	338.0	18.9	59.9	100.8	141.7	182.6	223.6	264.5	305.4	346.3	27.3	68.2	109.1		
	Venus	104.3	120.3	136.3	152.4	168.4	184.4	200.4	216.5	232.5	248.5	264.5	280.5	296.6	312.6	328.6	344.6	36.0	16.7		
	Rahu	67.5	67.0	66.4	65.9	65.4	64.9	64.4	63.8	63.3	62.7	62.2	61.7	61.1	60.6	60.1	59.6	59.0	58.5		
B.C. 1	Mercury	209.4	250.3	291.3	332.2	13.1	54.0	94.9	135.9	176.8	217.7	258.6	299.6	340.5	2.4	62.3	103.3	144.2	185.1		
	Venus	303.3	319.3	335.3	351.4	7.4	23.4	39.4	55.5	71.5	87.5	103.5	119.5	135.6	151.6	167.6	183.6	199.6	215.7		
	Rahu	291.7	291.2	290.6	290.1	289.6	289.1	288.5	288.0	287.5	286.9	286.4	285.9	285.3	284.8	284.3	283.8	283.2	282.7		
A.D. 500	Mercury	220.5	270.4	311.4	352.3	33.2	74.1	115.0	156.0	196.9	237.8	278.7	319.7	0.6	41.5	82.4	123.4	164.3	205.2		
	Venus	218.2	234.2	250.2	266.3	282.3	298.3	314.3	330.4	346.4	2.4	18.4	34.4	50.5	66.5	82.5	98.5	114.5	130.6		
	Rahu	332.6	332.1	331.5	331.0	330.5	330.0	329.4	328.9	328.4	327.8	327.3	326.8	326.2	325.7	325.2	324.7	324.1	323.6		
A.D. 1000	Mercury	249.6	290.5	331.5	12.4	53.3	94.2	135.1	176.1	217.0	257.9	298.8	339.8	20.7	61.6	102.5	143.5	184.4	225.3		
	Venus	132.1	149.1	165.1	181.2	197.2	213.2	229.2	245.3	261.3	277.3	293.3	309.3	325.4	341.4	357.4	13.4	29.4	45.5		
	Rahu	13.4	12.9	12.3	11.8	11.3	10.8	10.2	9.7	9.2	8.6	8.1	7.6	7.0	6.5	6.0	5.5	4.9	4.4		
A.D. 1500	Mercury	269.7	310.6	351.6	32.5	73.4	114.3	155.2	196.2	237.1	278.0	318.9	359.9	40.8	81.7	122.6	163.6	204.5	245.4		
	Venus	48.1	64.1	80.1	96.2	112.2	128.2	144.2	160.3	176.3	192.3	208.3	224.3	240.4	256.4	272.4	288.4	304.4	320.5		
	Rahu	54.3	53.8	53.2	52.7	52.2	51.7	51.1	50.6	50.1	49.5	49.0	48.5	47.9	47.4	46.9	46.4	45.8	45.3		
			DAYS OF SOLAR YEAR.																		
			180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
			Mean Longitude in Degrees.																		
B.C. 3201	Mercury	313.4	354.3	35.3	76.2	117.1	158.0	199.0	239.9	280.8	321.7	2.7	43.6	84.5	125.4	166.4	207.3	248.2	289.1	330.0	
	Venus	344.2	0.2	16.2	32.3	48.3	64.3	80.3	96.3	112.4	128.4	144.4	160.4	176.4	192.5	208.5	224.5	240.5	256.6	272.6	
	Rahu	308.7	308.2	307.6	307.1	306.5	306.0	305.5	305.0	304.4	303.9	303.4	302.8	302.3	301.8	301.2	300.7	300.2	299.7	299.1	
B.C. 3102	Mercury	334.7	18.6	56.6	97.5	138.4	179.3	220.3	261.2	302.1	343.0	2.0	43.0	84.0	125.0	166.0	207.0	248.0	289.0	330.0	
	Venus	318.0	334.0	350.0	6.1	22.1	38.1	54.1	70.1	86.2	102.2	118.2	134.2	150.2	166.3	182.3	198.3	214.3	230.4	246.4	
	Rahu	192.2	191.7	191.1	190.6	190.0	189.5	188.9	188.4	187.8	187.3	186.7	186.2	185.6	185.1	184.5	184.0	183.4	182.9		
B.C. 2601	Mercury	49.5	90.4	131.4	172.3	213.2	254.1	295.1	336.0	16.9	57.8	98.8	139.7	180.6	221.5	262.5	303.4	344.3	25.2	66.1	
	Venus	98.1	114.1	130.1	146.2	162.2	178.2	194.2	210.2	226.3	242.3	258.3	274.3	290.3	306.4	322.4	338.4	354.4	10.5	26.5	
	Rahu	213.7	213.2	212.6	212.1	211.5	211.0	210.5	210.0	209.4	208.9	208.4	207.8	207.3	206.8	206.2	205.7	205.2	204.7	204.2	
B.C. 2101	Mercury	69.6	110.5	151.5	192.4	233.3	274.2	315.2	356.1	37.0	77.9	118.9	159.8	200.7	241.6	282.6	323.5	4.4	45.3	86.2	
	Venus	13.0	29.0	45.0	61.1	77.1	93.1	109.1	125.1	141.2	157.2	173.2	189.2	205.2	221.3	237.3	253.3	269.3	285.4	301.4	
	Rahu	254.6	254.1	253.5	253.0	252.4	251.9	251.4	250.9	250.3	249.8	249.3	248.7	248.2	247.7	247.1	246.6	246.1	245.6	245.0	
B.C. 1601	Mercury	89.7	130.6	171.6	212.5	253.4	294.3	335.3	16.2	57.1	98.0	139.0	179.9	220.8	261.7	302.6	343.6	24.5	65.4	106.3	
	Venus	287.9	303.9	319.9	336.0	352.0	7.0	23.0	39.0	55.1	71.1	87.1	103.1	119.1	135.2	151.2	167.2	183.2	199.3	215.3	
	Rahu	295.4	294.9	294.3	293.8	293.2	292.7	292.2	291.7	291.1	290.6	290.1	289.5	289.0	288.5	287.9	287.4	286.9	286.4	285.9	
B.C. 1101	Mercury	109.8	150.7	191.7	232.6	273.5	314.4	355.4	36.3	77.2	118.1	159.1	200.0	240.9	281.8	322.8	3.7	44.6	85.5	126.4	
	Venus	202.8	218.8	234.8	250.9	266.9	282.9	298.9	314.9	331.0	347.0	3.0	19.0	35.0	51.1	67.1	83.1	99.1	115.2	131.2	
	Rahu	336.3	335.8	335.2	334.7	334.1	333.6	333.1	332.6	332.0	331.5	331.0	330.4	329.9	329.4	328.8	328.3	327.8	327.3	326.8	
B.C. 601	Mercury	129.9	170.8	211.8	252.7	293.6	334.5	15.5	56.4	97.3	138.2	179.2	220.1	261.0	301.9	342.9	2.8	43.7	84.6	125.5	
	Venus	117.8	133.8	149.8	165.9	181.9	197.9	213.9	229.9	246.0	262.0	278.0	294.0	310.0	326.1	342.1	358.1	14.1	30.2	46.2	
	Rahu	17.2	16.7	16.1	15.6	15.0	14.5	14.0	13.5	12.9	12.4	11.9	11.3	10.8	10.3	9.7	9.2	8.7	8.2	7.7	
B.C. 101	Mercury	150.0	190.9	231.9																	

TABLE P.E.—MARS EYE-TABLE
 Showing actual longitude (in ordinary type) corresponding to mean longitude (in heavy type) for every ten complete days
 of the Indian Solar Year.

Mean longi- tude in Degrees.	0 day.	10 days.	20 days.	30 days.	40 days.	50 days.	60 days.	70 days.	80 days.	90 days.	100 days.	110 days.	120 days.	130 days.	140 days.	150 days.	160 days.	170 days.	180 day.
	Degrees.																		
0	50	91	130	170	208	247	286	323	359	393	426	452	479	507	513	511	494	447	334
10	115	154	194	234	275	312	351	390	427	463	495	523	555	582	601	615	611	601	554
20	180	217	258	296	335	375	415	453	490	526	562	589	626	657	683	700	716	716	701
30	245	284	320	360	396	438	477	515	552	590	626	654	693	724	754	777	799	814	813
40	309	346	382	422	457	498	536	574	612	649	687	716	756	788	820	846	872	892	905
50	373	408	443	482	517	557	594	632	671	707	745	775	817	851	884	913	942	967	983
60	438	470	505	542	577	614	652	690	727	764	803	837	874	911	944	976	1005	1031	1057
70	503	532	565	600	636	672	710	746	783	821	859	892	932	966	1001	1036	1066	1095	1121
80	568	597	627	659	693	729	766	801	836	875	914	945	984	1024	1057	1093	1124	1155	1185
90	633	660	689	719	751	786	821	856	893	927	966	998	1039	1076	1114	1146	1180	1212	1244
100	701	723	748	778	806	843	875	911	947	984	1021	1051	1091	1130	1166	1200	1236	1271	1301
110	774	790	811	837	866	899	932	964	1000	1036	1071	1105	1146	1183	1218	1255	1290	1326	1358
120	847	859	877	900	926	955	986	1020	1054	1089	1125	1155	1198	1233	1270	1305	1343	1373	1413
130	937	934	943	964	988	1013	1044	1074	1108	1142	1178	1209	1248	1285	1322	1358	1395	1430	1465
140	1032	1016	1018	1031	1047	1072	1101	1130	1162	1195	1228	1261	1299	1340	1374	1411	1448	1483	1518
150	1144	1109	1097	1103	1115	1136	1160	1187	1217	1249	1283	1312	1353	1390	1425	1462	1500	1535	1572
160	1265	1213	1186	1181	1185	1199	1221	1245	1273	1306	1338	1367	1406	1442	1478	1513	1552	1588	1625
170	1417	1337	1290	1267	1261	1269	1282	1306	1333	1363	1393	1420	1460	1496	1531	1568	1606	1642	1678
180	1600	1484	1409	1367	1348	1346	1354	1373	1393	1421	1450	1478	1516	1554	1585	1622	1657	1696	1732
190	1828	1674	1552	1485	1447	1431	1430	1442	1459	1483	1510	1536	1574	1606	1641	1676	1712	1750	1787
200	2073	1915	1770	1634	1564	1529	1516	1518	1530	1549	1572	1594	1631	1663	1697	1732	1768	1804	1842
210	2285	2170	2006	1838	1714	1647	1615	1604	1605	1618	1640	1666	1692	1722	1757	1788	1825	1862	1900
220	2456	2394	2278	2110	1934	1808	1737	1703	1693	1697	1712	1728	1756	1781	1817	1849	1885	1922	1959
230	2592	2566	2505	2394	2220	2036	1908	1829	1797	1785	1791	1800	1827	1852	1882	1912	1945	1982	2021
240	2709	2705	2608	2628	2515	2342	2153	2007	1930	1894	1883	1879	1901	1924	1950	1977	2011	2046	2082
250	2808	2820	2820	2802	2759	2646	2475	2275	2120	2035	1995	1973	1988	2003	2023	2048	2079	2110	2145
260	2900	2922	2935	2941	2926	2874	2784	2619	2450	2242	2146	2090	2089	2092	2104	2125	2153	2182	2213
270	2983	3013	3037	3053	3064	3048	3010	2930	2768	2550	2369	2242	2210	2193	2197	2210	2231	2257	2286
280	3067	3098	3128	3154	3174	3180	3174	3142	3069	2930	2704	2472	2387	2327	2304	2305	2319	2338	2366
290	3146	3183	3214	3244	3271	3290	3305	3299	3257	3206	3081	2935	2864	2818	2805	2820	2841	2861	2890
300	3223	3260	3296	3331	3360	3386	3411	3422	3426	3404	3351	3294	3025	2809	2650	2571	2543	2534	2544
310	3297	3337	3375	3410	3444	3476	3505	3527	3543	3546	3533	3470	3379	3199	2965	2796	2705	2664	2654
320	3371	3412	3450	3488	3524	3557	3591	18	41	60	68	44	17	3529	3365	3132	2948	2843	2792
330	3443	3485	3520	3556	3598	3634	3671	71	101	131	155	173	174	176	146	75	3501	3293	3098
340	3513	3553	3585	3618	3658	3698	3738	146	180	211	241	265	279	294	295	268	200	63	3456
350	3582	22	61	101	142	180	219	254	287	317	350	369	393	405	406	380	325	204	12
Mean longi- tude in Degrees.	190 days.	200 days.	210 days.	220 days.	230 days.	240 days.	250 days.	260 days.	270 days.	280 days.	290 days.	300 days.	310 days.	320 days.	330 days.	340 days.	350 days.	360 days.	
	Degrees.																		
0	151	3553	3393	3313	3275	3201	3267	3284	3305	3334	3365	3407	3434	3473	3508	3547	3588	26	
10	450	293	85	3534	3439	3393	3378	3381	3395	3418	3446	3477	3508	3545	3580	18	56	93	
20	650	575	422	224	63	3563	3511	3491	3493	3506	3528	3554	3580	21	50	86	122	159	
30	798	760	680	532	352	183	82	27	04	03	15	35	60	89	120	153	188	226	
40	908	891	853	774	030	469	297	192	137	112	110	121	138	163	190	221	255	288	
50	996	907	981	941	868	737	568	403	299	240	222	213	222	240	264	292	322	355	
60	1073	1084	1085	1066	1028	951	822	657	505	399	341	320	312	321	343	362	389	420	
70	1148	1162	1170	1169	1148	1108	1027	901	744	593	495	439	415	412	415	417	456	486	
80	1211	1232	1248	1255	1251	1230	1178	1098	976	815	686	582	529	507	503	512	529	551	
90	1272	1299	1320	1333	1340	1332	1307	1252	1167	1036	892	757	666	617	596	593	604	620	
100	1332	1358	1383	1404	1417	1422	1411	1379	1321	1220	1102	954	821	747	702	682	683	692	
110	1389	1418	1445	1468	1485	1500	1501	1486	1452	1387	1289	1156	1016	900	827	783	769	769	
120	1444	1476	1507	1532	1557	1574	1583	1581	1564	1522	1448	1321	1214	1075	967	899	865	853	
130	1499	1534	1563	1592	1619	1640	1656	1665	1663	1641	1591	1509	1391	1256	1129	1033	973	944	
140	1554	1588	1620	1651	1678	1705	1716	1743	1750	1742	1718	1664	1570	1441	1310	1189	1100	1049	
150	1608	1642	1676	1709	1739	1769	1792	1814	1829	1835	1827	1796	1733	1631	1497	1361	1246	1164	
160	1661	1697	1731	1766	1798	1828	1856	1891	1900	1916	1920	1910	1874	1806	1694	1551	1416	1307	
170	1715	1753	1787	1823	1857	1888	1918	1946	1973	1994	2004	2007	1995	1957	1881	1762	1614	1472	
180	1769	1806	1843	1880	1915	1948	1981	2010	2040	2063	2083	2096	2099	2081	2042	1963	1833	1673	
190	1823	1863	1899	1942	1973	2008	2041	2074	2105	2132	2158	2177	2190	2191	2175	2130	2051	1914	
200	1880	1917	1956	1992	2031	2066	2101	2137	2169	2202	2229	2253	2273	2285	2288	2272	2228	2142	
210	1937	1974	2013	2050	2089	2126	2162	2198	2233	2266	2290	2328	2352	2372	2385	2386	2371	2327	
220	1996	2032	2070	2109	2148	2186	2224	2267	2297	2334	2360	2400	2428	2454	2474	2486	2491	2474	
230	2055	2091	2128	2169	2210	2247	2286	2325	2362	2398	2434	2470	2						

TABLE P.E.—MERCURY EYE-TABLE.

Showing actual longitude (in ordinary type) corresponding to mean longitude (in heavy type) for every ten complete days of the Indian Solar year.

Mean longitude in Degrees.	0 day.	10 days.	20 days.	30 days.	40 days.	50 days.	60 days.	70 days.	80 days.	90 days.	100 days.	110 days.	120 days.	130 days.	140 days.	150 days.	160 days.	170 days.	180 days.
	Degrees.																		
0	355.7	3.5	10.7	19.2	26.9	34.5	43.0	51.7	60.4	69.1	79.0	88.1	99.0	110.2	122.5	135.0	150.5	164.0	178.0
10	358.2	6.3	13.5	22.0	29.5	37.0	45.5	53.3	62.0	70.6	79.5	89.0	99.0	109.0	120.0	131.7	145.5	158.5	173.0
20	1.0	9.4	16.5	24.5	32.0	39.7	48.0	56.0	64.5	72.0	80.7	90.0	99.2	109.0	118.5	130.0	141.5	154.0	168.0
30	4.6	12.0	19.7	27.0	34.6	42.4	50.7	58.5	67.0	74.5	82.2	91.5	100.5	109.2	119.0	129.0	138.3	151.5	163.5
40	6.5	14.3	22.2	29.5	37.2	45.7	53.1	61.0	69.0	77.0	84.5	93.1	101.7	110.6	119.5	129.0	137.9	149.4	160.2
50	8.5	16.7	24.7	32.1	40.6	48.2	55.1	63.5	71.0	79.5	87.0	94.7	103.0	111.8	120.0	129.0	138.0	148.1	159.2
60	11.0	19.7	27.2	34.7	43.5	50.7	58.4	66.0	74.1	82.0	89.7	97.2	104.7	113.1	120.9	129.6	139.0	148.0	158.0
70	12.7	21.3	29.7	37.4	46.3	53.3	61.0	68.5	77.2	84.6	92.2	99.7	107.2	114.7	122.5	131.0	140.0	148.0	157.0
80	14.6	23.4	32.1	40.0	48.6	55.9	64.7	72.0	79.7	87.2	94.7	102.2	110.0	117.2	124.9	132.5	141.0	148.7	157.4
90	16.0	25.2	33.9	42.5	51.0	58.5	67.0	74.7	82.2	89.7	97.2	104.7	112.5	119.7	127.5	135.0	142.5	150.7	158.7
100	17.0	26.9	35.7	44.5	53.2	61.2	69.5	77.4	85.1	92.5	99.7	107.4	115.0	122.2	130.0	137.5	144.5	152.4	160.0
110	16.6	27.0	37.0	46.5	55.1	63.5	72.0	80.0	87.7	95.0	102.3	110.0	117.5	124.7	132.0	139.0	146.7	154.0	161.7
120	15.3	27.0	38.0	47.0	56.9	65.5	74.4	82.5	90.0	98.2	105.0	112.5	120.0	127.2	135.5	141.5	149.2	156.7	163.6
130	14.0	27.0	38.0	48.3	58.1	67.5	76.2	85.0	92.5	101.0	107.6	115.0	122.7	130.0	137.8	144.0	151.6	159.0	165.5
140	12.1	25.8	37.2	48.4	59.0	69.0	77.9	87.0	95.0	102.5	110.2	117.5	125.1	132.7	140.5	148.5	154.2	161.4	168.2
150	8.1	23.0	35.6	48.0	59.6	69.4	79.1	89.0	96.7	104.6	112.7	120.0	128.7	135.2	142.7	149.2	156.7	164.0	170.4
160	3.5	19.1	33.2	46.9	59.1	70.0	80.0	90.1	99.1	108.7	115.2	122.7	131.2	137.7	145.4	152.1	159.3	166.5	173.2
170	357.4	4.5	29.9	44.9	57.7	70.0	80.7	90.6	100.4	109.1	117.7	125.2	132.7	140.1	148.0	155.2	162.0	169.1	176.0
180	351.5	9.3	35.0	41.0	55.0	68.5	80.0	91.0	101.0	110.4	119.1	127.0	135.2	142.7	150.5	158.0	164.5	171.5	178.5
190	346.3	2.5	19.1	36.0	51.7	66.0	78.7	90.9	101.9	111.6	120.4	129.2	137.7	145.5	152.5	160.2	167.2	174.0	181.2
200	342.0	356.2	13.9	29.8	48.0	62.7	76.7	89.6	101.7	112.0	121.7	130.5	139.2	147.0	154.5	162.1	169.5	176.5	183.7
210	337.5	352.0	8.0	23.7	41.8	58.0	73.4	87.6	100.0	111.7	122.5	131.7	140.5	148.5	157.0	164.7	171.5	179.0	186.0
220	335.0	347.9	3.0	18.5	35.5	53.1	69.5	84.0	98.2	110.4	121.0	132.0	141.9	150.0	158.6	166.1	173.5	181.6	188.7
230	332.3	344.0	358.9	13.5	29.6	46.9	64.1	79.1	95.0	108.5	121.4	132.0	142.0	151.7	160.0	167.7	175.5	184.0	191.2
240	333.0	343.1	355.7	9.2	24.5	41.5	57.9	73.9	90.8	106.0	118.2	130.7	142.0	152.0	161.0	169.6	177.7	186.2	193.7
250	333.0	343.0	354.1	6.7	20.1	35.6	51.6	67.6	84.7	101.0	115.6	129.1	140.9	151.6	162.0	170.9	179.7	187.4	195.2
260	333.6	343.0	353.0	5.1	17.5	31.9	47.0	62.5	78.6	95.7	111.5	125.6	139.1	150.3	161.6	171.0	180.0	188.7	196.5
270	334.9	343.7	353.0	4.0	15.0	28.6	42.5	57.5	73.4	90.0	105.9	121.5	135.6	148.0	159.8	171.0	181.5	190.0	197.9
280	336.1	345.0	354.4	4.0	14.2	26.0	39.5	53.1	68.0	84.4	100.0	116.5	131.5	145.2	158.0	169.5	179.2	189.4	199.0
290	338.0	346.6	355.0	4.7	15.0	25.0	37.0	49.4	63.0	78.7	94.0	111.5	126.3	141.5	155.2	168.0	179.2	189.4	199.0
300	340.5	348.5	356.5	6.0	15.7	25.0	36.0	47.7	60.0	74.0	89.5	105.3	121.0	137.0	151.3	165.2	177.0	188.1	199.0
310	343.2	350.3	358.6	7.4	16.1	25.9	36.0	46.5	58.7	71.0	85.0	100.0	115.8	131.0	146.5	161.0	173.7	187.0	198.1
320	345.7	353.0	0.7	9.2	17.7	27.1	36.0	46.0	57.5	68.7	81.0	95.4	110.0	125.4	140.5	156.4	170.5	185.2	195.7
330	348.1	355.7	2.3	11.7	19.6	28.4	37.1	47.1	57.0	68.0	79.7	91.7	105.4	119.9	135.5	150.4	165.5	179.5	192.5
340	350.7	358.2	5.9	14.2	22.0	30.2	38.9	48.4	58.0	68.0	78.4	89.5	102.7	115.4	130.5	144.3	160.4	174.5	188.0
350	353.2	1.0	8.2	16.7	24.4	32.0	40.7	50.0	59.0	69.0	78.0	89.0	100.2	112.5	125.5	139.0	155.5	169.0	183.0

Mean longitude in De. res.	190 days.	200 days.	210 days.	220 days.	230 days.	240 days.	250 days.	260 days.	270 days.	280 days.	290 days.	300 days.	310 days.	320 days.	330 days.	340 days.	350 days.	360 days.
	Degrees.																	
0	193.0	206.4	218.5	231.0	241.7	253.0	263.0	272.0	281.5	290.0	297.9	306.0	314.4	322.0	329.0	337.2	344.4	352.0
10	187.1	200.5	214.0	226.0	239.5	251.2	262.0	272.0	282.0	291.0	299.0	307.7	316.2	323.7	332.4	339.7	348.6	356.0
20	181.5	195.5	209.0	224.0	235.7	248.1	260.2	270.7	281.2	291.1	300.4	309.2	317.7	326.2	334.0	341.7	350.0	357.5
30	177.0	190.0	204.0	218.0	232.0	244.6	256.9	269.6	280.0	291.0	301.0	310.0	319.2	327.9	335.7	344.2	352.5	0.0
40	172.7	185.0	199.0	213.0	225.5	241.6	253.3	267.0	278.0	290.0	301.0	310.6	320.0	329.2	338.0	345.9	354.0	2.7
50	169.1	181.2	194.0	207.6	220.5	235.0	248.5	262.3	274.9	287.9	299.5	310.1	320.0	330.0	339.4	348.2	356.5	4.6
60	167.4	179.0	190.5	202.6	216.4	229.9	244.0	258.4	272.0	285.0	297.0	308.9	320.0	330.0	340.0	349.4	358.1	6.7
70	167.0	176.7	187.7	199.2	210.7	225.3	238.5	252.0	267.0	281.4	293.5	307.0	318.6	330.0	340.0	350.0	359.5	8.4
80	167.0	176.0	186.1	196.7	207.9	220.0	233.5	247.0	261.5	276.2	290.5	303.7	317.0	328.6	339.7	350.9	0.7	9.5
90	167.0	176.0	185.0	195.1	205.2	217.0	228.9	242.0	256.0	269.9	284.5	300.0	313.6	327.0	338.5	350.0	1.0	10.6
100	167.7	176.6	185.5	194.1	204.0	214.5	225.1	237.9	250.6	264.5	280.0	294.0	310.0	323.3	336.7	349.0	0.6	12.0
110	169.0	178.0	186.0	195.0	203.0	213.0	223.6	235.0	246.5	260.0	274.2	288.2	304.0	318.5	333.0	346.5	359.5	11.0
120	171.1	179.1	187.0	195.0	203.5	212.4	222.0	232.5	243.7	256.2	269.5	284.0	298.5	314.0	329.0	344.0	356.6	9.7
130	173.2	181.0	188.2	196.1	204.0	213.0	222.0	231.0	241.2	253.0	264.9	278.6	293.5	308.9	323.5	339.0	354.0	7.2
140	175.7	182.7	190.0	197.1	205.0	213.0	221.4	230.6	240.0	251.1	262.4	274.9	288.0	303.5	318.0	333.9	349.0	4.0
150	178.2	185.0	191.9	199.0	206.7	214.1	222.7	230.6	240.0	249.9	260.2	271.7	283.1	297.2	312.2	328.5	343.9	359.5
160	180.7	187.5	194.2	200.7	208.6	215.7	224.1	232.0	240.0	249.0	260.2	269.2	280.7	293.1	307.1	322.5	338.5	355.5
170	183.2	190.2	196.7	203.2	211.0	217.6	225.5	233.2	241.0	249.7	259.5	268.0	279.0	290.5	303.5	317.0	332.8	348.7
180	185.7	192.7	199.2	205.7	213.5	220.2	227.5	234.4	242.2	250.9	259.2	268.0	277.7	288.0	300.2	312.6	327.5	343.0
190	188.0	195.5	201.7	208.5	215.5	221.7	229.0	237.5	244.0	251.5	260.0	268.0	277.5	287.6	299.0	310.0	322.6	338.0
200	190.2	198.0	204.2	211.0	217.5	225.0	231.7	239.0	245.5	253.0	261.4	269.0	279.0	287.0	297.5	307.7	320.0	333.6
210	192.7	200.2	207.0	213.5	220.0	226.9	234.0	240.7	248.5	254.9	262.2	270.4	279.1	287.9	297.0	307.0	317.7	330.7
220	195.2	203.0	209.5	216.0	222.9	229.5	236.5	243.2	250.4	257.5	265.1	272.2	280.5	288.5	298.0	307.0	317.0	323.2
230	197.7	205.5	212.2	218.5	225.5	232.1	239.5	245.7	252.2	260.0	267.2	274.7	281.6	290.4	299.4	307.0	317.0	327.0
240	200.5	208.2	214.7	221.0	228.6	235.2	241.7	248.7	255.6	262.5	268.7	275.5	283.7	291.7	300.0	308.5	318.0	327.0
250	202.7	210.7	217.0	223.0	231.2	237.2	244.5	251.0	258.2	265.0	271.5	279.0	286.1	294.0	301.9	309.6	318.5	327.1
260	204.2	212.1	218.9	225.5	233.0	240.5	247.7	253.2	260.5	267.5	274.0	281.2	288.1	296.2	303.2	311.0	319.6	328.4
270	206.0	214.0	221.2	228.0	235.2	243.0	249.0	256.0	263.5	270.0	277.7	284.0	291.6	298.0	305.7	313.5	321.7	329.7
280	207.7	215.7	223.5	230.5	237.7	244.7	252.0	259.7	265.6	272.5	280.2	286.7	293.3	300.5	308.5	316.0	323.5	332.0
290	208.1	216.7	224.7	232.5	240.4	247.0	254.5	261.9	268.7	275.0	282.7	289.2	296.4	303.0	311.0	318.5	326.0	333.7
300	208.6	217.2	226.0	233.7	241.5	249.4	256.0	263.7	271.0	277.7	285.0	291.7	298.5	305.7	313.5	321.0	328.7	336.0
310	208.0	217.5	226.2	234.0	242.9	250.5	258.2	266.5	273.9	280.2	287.7	294.2	301.7	308.8	316.0	323.5	331.2	338.5
320	207.1	217.0	227.0	236.0	244.2	252.5	260.2	268.4	275.5	283.0	290.2	297.0	304.2	312.0	318.5	326.2	333.7	341.2
330	204.7	215.7	226.2	236.0	245.0	253.2	261.9	269.6	277.5	284.5	292.7	299.5	307.0	314.5	322.0	329.7	336.2	343.7
340	201.1	213.2	224.9	235.1	245.0	254.0	263.0	270.9	278.7	287.0	294.7	301.7	309.5	317.0	322.7	332.2	338.7	346.7
350	197.0	210.2	222.9	233.7	244.1	254.0	263.0	272.0	281.0	288.5	296.5	304.4	312.0	319.5	327.9	335.0	341.3	349.0

TABLE P.E.—JUPITER EYE-TABLE

Showing actual longitude (in ordinary type) corresponding to mean longitude (in heavy type) for every ten complete days of the Indian Solar Year.

Mean longitude in Degrees.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
	day.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.	days.
	Degree.																		
0	0.1	2.0	3.5	5.1	6.5	8.2	9.3	10.7	11.6	12.3	13.8	12.8	12.4	11.8	10.6	8.9	6.9	4.6	2.3
10	9.4	11.2	12.9	14.3	16.0	17.6	19.0	20.4	21.5	22.5	24.2	23.8	23.7	23.4	22.7	21.6	20.0	18.0	16.0
20	18.6	20.2	21.8	23.3	24.9	26.3	27.9	29.7	30.9	32.2	34.0	33.9	34.4	34.6	34.2	33.3	32.4	30.9	29.1
30	27.7	29.2	30.7	32.3	34.1	35.7	37.2	38.9	40.3	41.7	43.8	43.8	44.7	45.0	45.3	44.9	44.4	43.4	41.9
40	36.6	38.1	39.7	41.2	42.9	44.3	46.0	47.9	49.1	50.8	53.0	53.5	54.3	55.3	55.6	55.8	55.7	54.9	54.1
50	45.8	47.4	48.7	50.0	51.6	53.4	54.9	56.4	57.9	59.6	62.1	62.5	63.7	64.7	65.5	66.0	66.2	66.1	65.4
60	55.0	56.1	57.4	59.0	60.3	61.7	63.5	65.1	66.6	68.6	71.0	71.4	72.6	73.6	74.8	75.6	76.3	76.5	76.4
70	64.4	65.2	66.3	67.5	68.9	70.3	72.0	73.5	75.2	76.9	79.1	80.0	81.5	82.8	84.1	84.9	85.8	86.1	86.6
80	74.1	74.4	75.5	76.4	77.6	78.9	80.4	81.8	84.2	85.2	87.6	88.4	90.0	91.5	92.7	93.6	95.0	95.7	96.3
90	83.5	83.0	84.1	85.1	86.3	87.6	88.7	90.2	92.0	93.8	95.9	96.7	98.4	99.6	101.2	102.7	103.7	104.7	105.5
100	93.5	93.4	93.7	94.1	95.0	96.1	97.2	98.7	100.0	101.6	104.1	104.9	106.4	108.0	109.5	111.0	112.3	113.4	114.5
110	103.6	103.3	103.2	103.4	104.1	104.7	106.0	107.4	108.7	110.1	112.3	113.2	114.7	116.3	117.9	119.0	120.6	122.1	123.1
120	113.9	113.2	112.7	112.6	113.1	113.5	114.2	115.4	116.7	118.0	120.4	121.0	122.4	124.4	125.7	127.2	128.8	130.1	131.6
130	124.4	123.3	122.6	122.2	122.1	122.7	123.1	124.1	124.9	126.2	128.6	129.2	130.6	132.1	133.6	135.3	136.7	138.1	139.8
140	135.1	133.7	132.7	131.9	131.6	131.5	131.8	132.4	133.3	134.4	136.6	137.1	138.6	140.1	141.4	143.0	144.9	146.1	147.8
150	146.2	144.3	143.0	141.7	141.1	140.8	140.8	141.4	141.7	142.8	144.6	144.9	146.5	148.0	149.2	150.7	152.2	153.9	155.3
160	157.2	155.4	153.5	151.9	151.0	150.1	149.9	150.0	150.3	151.1	152.8	153.1	154.2	155.3	157.0	158.5	160.1	161.6	162.9
170	168.4	166.1	164.2	162.4	161.0	160.0	159.2	159.2	159.5	160.0	161.1	162.3	163.6	164.2	166.2	167.8	169.3	170.7	
180	179.6	177.4	175.2	173.4	171.8	170.0	169.0	168.7	168.4	168.5	169.5	169.3	170.4	171.7	172.9	174.8	175.6	176.9	178.4
190	191.0	188.6	186.4	184.4	182.6	180.5	179.1	178.2	177.5	177.2	178.5	177.9	178.6	179.4	180.7	182.0	183.3	184.8	186.2
200	202.0	200.0	198.3	195.4	193.4	191.2	189.5	188.3	187.4	186.8	187.5	186.8	187.2	187.8	188.8	189.8	191.4	192.7	194.1
210	213.3	211.2	209.0	206.8	204.5	202.4	200.4	198.6	197.4	196.6	196.8	195.9	196.0	196.5	197.4	198.3	199.2	200.4	202.0
220	224.1	222.5	220.6	218.3	216.1	213.9	211.6	209.7	208.1	206.6	206.8	205.3	205.1	205.4	205.7	206.4	207.4	208.5	210.0
230	235.2	233.5	231.7	229.6	227.8	225.4	223.1	220.9	219.1	217.3	216.9	215.2	214.7	214.5	214.6	214.9	215.9	216.7	218.1
240	245.8	244.7	243.3	241.6	239.7	237.4	235.0	232.6	230.7	228.5	226.6	224.2	222.4	221.2	221.4	221.8	222.4	225.4	226.6
250	256.2	255.6	254.6	253.2	251.2	249.2	247.0	244.6	242.3	239.8	239.2	236.6	235.1	234.5	233.7	233.6	233.7	234.2	235.3
260	266.3	266.1	266.3	264.4	263.1	261.3	259.0	256.9	254.5	252.2	251.1	248.0	246.3	245.1	244.1	243.6	243.6	243.7	244.3
270	276.6	276.6	276.3	275.6	274.5	273.2	271.4	269.3	266.9	264.4	263.4	260.0	258.0	256.2	255.0	254.1	253.5	253.2	254.0
280	286.1	286.6	286.8	286.5	285.9	284.9	283.4	281.7	279.2	277.0	276.3	272.6	270.2	268.0	266.5	264.9	264.2	263.5	263.6
290	296.6	296.8	296.9	297.0	297.1	296.3	295.4	293.9	292.2	290.2	288.8	285.4	282.9	280.6	278.7	276.7	275.3	274.4	273.8
300	307.9	306.0	307.1	307.5	307.7	307.6	306.8	306.0	304.5	302.8	302.0	298.2	295.9	293.7	291.5	288.9	287.2	285.8	284.8
310	314.5	315.7	316.7	317.6	318.2	318.3	318.2	317.5	316.7	315.3	314.8	311.7	309.2	306.6	304.2	301.7	299.7	297.7	296.3
320	323.6	325.0	326.2	327.4	328.3	328.8	329.1	329.0	328.4	327.5	327.5	324.6	322.4	320.1	317.6	315.1	312.6	310.4	308.7
330	332.0	334.4	335.8	337.0	338.2	339.1	339.5	339.9	340.0	339.4	339.8	337.2	335.5	333.6	331.4	328.7	326.2	323.6	321.5
340	342.3	343.7	345.4	346.7	347.9	349.0	349.8	350.5	350.9	350.7	351.7	349.7	348.5	346.6	344.8	342.8	340.0	337.3	334.7
350	351.0	352.6	354.2	356.2	357.4	358.8	0.0	0.9	1.5	2.0	3.0	1.5	0.7	359.6	357.8	355.8	353.6	351.0	348.7
Mean longitude in Degrees.	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	days
	Degree.																		
0	359.8	357.2	354.9	352.8	351.3	349.0	349.2	348.8	348.8	349.0	349.6	349.8	351.6	353.0	354.4	355.9	357.6	359.3	
10	13.5	10.9	8.6	6.3	4.3	2.5	1.3	0.2	3.9	3.6	3.9	0.6	1.4	2.7	4.0	5.4	6.9	8.5	
20	27.3	24.6	22.1	19.4	17.2	15.1	13.3	12.0	11.2	10.6	10.5	10.8	11.3	12.1	13.3	14.6	16.0	17.4	
30	40.0	37.7	35.6	32.9	30.6	28.1	26.1	24.4	23.1	22.0	21.4	21.3	21.5	22.2	23.1	24.0	25.2	26.6	
40	52.5	50.7	48.7	46.4	44.0	41.4	39.3	37.0	35.3	33.9	32.9	32.3	32.0	32.4	32.8	33.6	34.6	35.8	
50	64.5	63.1	61.3	59.1	56.9	54.4	52.2	49.7	47.6	45.8	44.4	43.4	42.8	42.7	43.2	43.5	44.1	45.1	
60	75.8	75.0	73.5	71.8	69.7	67.3	65.1	62.6	60.2	58.1	56.3	54.8	53.8	53.3	53.2	53.1	53.6	54.5	
70	86.5	85.9	84.9	83.6	81.9	79.6	77.7	75.4	73.1	70.7	68.7	66.7	65.3	64.3	63.8	63.3	63.5	63.9	
80	96.4	96.4	96.0	95.1	93.4	91.9	90.0	87.8	85.6	83.0	80.7	78.7	76.8	75.5	74.5	73.7	73.6	73.7	
90	106.1	106.1	106.3	105.6	104.8	103.6	102.0	100.1	97.7	95.3	92.9	90.8	88.6	86.8	85.4	84.2	83.7	83.5	
100	115.3	115.7	116.1	115.7	115.4	114.5	113.3	111.5	109.6	107.5	105.2	102.8	100.4	98.3	96.6	95.2	94.1	93.6	
110	124.2	124.8	125.4	125.5	125.5	124.9	124.1	122.8	121.1	119.2	116.9	114.8	112.4	110.2	108.3	106.3	105.0	104.0	
120	132.7	133.7	134.5	134.9	135.1	135.1	134.6	133.4	132.3	130.5	128.5	126.4	124.2	121.9	119.7	117.5	115.9	114.5	
130	140.7	142.1	142.9	143.9	144.4	144.3	144.1	143.6	142.7	141.5	139.7	137.8	135.6	133.1	131.0	128.8	126.8	125.0	
140	149.0	150.3	151.5	152.3	153.0	153.5	153.6	153.6	153.0	151.9	150.6	149.1	146.9	144.8	142.7	140.2	138.0	136.1	
150	157.0	158.3	159.6	160.6	161.6	162.5	162.8	162.9	162.6	162.1	160.8	159.7	157.9	155.9	153.9	151.6	149.2	147.2	
160	164.7	166.1	167.7	168.8	170.0	170.8	171.5	171.8	172.0	171.7	170.9	170.4	168.8	167.0	164.9	162.7	160.7	158.3	
170	172.3	173.9	175.3	176.8	177.9	179.1	180.1	180.6	181.0	181.1	180.7	180.2	179.0	177.6	175.9	173.8	171.8	169.5	
180	180.4	181.7	183.2	184.5	186.2	187.4	188.5	189.2	189.8	190.4	190.3	190.0	189.2	188.2	186.9	184.9	183.1	180.3	
190	188.2	189.4	1																

TABLE P.E.—VENUS EYE-TABLE.

Showing actual longitude (in ordinary type) corresponding to mean longitude (in heavy type) for every ten complete days of the Indian Solar Year.

Mean longitude in Degrees.	0 day.	10 days.	20 days.	30 days.	40 days.	50 days.	60 days.	70 days.	80 days.	90 days.	100 days.	110 days.	120 days.	130 days.	140 days.	150 days.	160 days.	170 days.	180 days.
	Degrees.																		
0	0	5	11	17	22	28	34	40	46	52	58	65	72	80	88	99	112	131	156
10	3	10	15	20	26	32	38	44	50	55	62	68	75	82	89	98	108	121	140
20	8	14	19	25	31	36	42	48	53	59	66	71	77	84	92	99	107	118	131
30	12	20	24	29	35	40	46	51	58	63	69	75	81	88	94	101	109	118	128
40	16	22	27	33	39	45	50	56	62	67	73	79	85	91	97	104	111	118	127
50	20	26	32	37	43	49	54	60	66	71	77	83	89	95	100	107	113	121	128
60	24	30	36	42	47	53	58	64	69	75	81	87	93	98	104	110	117	123	130
70	28	35	40	46	51	57	63	68	74	79	85	91	96	102	108	114	120	127	133
80	32	38	44	50	55	61	66	72	78	83	89	95	100	106	112	118	124	130	137
90	38	42	48	54	60	65	71	77	82	88	93	99	105	110	116	122	128	134	140
100	38	45	51	57	63	69	75	81	87	92	98	103	109	114	120	126	132	137	144
110	42	48	55	61	67	73	79	85	90	96	102	107	112	119	124	130	136	142	148
120	44	51	58	65	71	77	83	88	94	100	106	111	117	123	128	134	140	146	151
130	45	53	61	68	75	81	87	93	98	104	110	116	121	127	133	138	144	150	156
140	45	55	63	71	77	84	91	96	103	108	114	119	125	131	136	142	148	154	159
150	43	45	65	73	80	88	94	100	106	112	118	124	130	135	141	146	152	158	164
160	37	53	65	74	83	90	97	104	110	116	122	128	133	140	145	151	156	162	168
170	23	46	62	74	84	92	100	107	113	120	125	132	137	143	149	155	161	166	172
180	1	32	56	72	84	93	102	110	117	123	129	135	142	148	153	159	165	170	176
190	336	7	41	55	81	93	103	112	119	126	133	139	145	151	158	163	169	174	180
200	322	345	15	50	74	91	94	113	121	129	136	143	149	155	161	167	173	179	185
210	315	333	353	22	59	83	100	112	123	131	139	146	153	158	165	171	177	183	189
220	313	325	342	4	34	68	92	109	122	132	141	148	155	162	168	175	181	187	193
230	314	323	335	350	14	43	77	101	119	132	143	150	158	165	172	178	185	191	197
240	315	323	333	315	0	23	53	87	110	128	141	151	160	168	175	182	188	193	201
250	317	325	333	343	354	9	30	61	92	119	138	151	160	170	178	185	192	198	204
260	321	327	335	343	353	4	19	42	70	101	128	147	160	171	180	188	195	202	209
270	324	330	337	315	352	3	13	28	18	79	109	138	156	170	181	190	197	205	212
280	327	334	340	347	354	3	12	23	38	57	87	117	147	165	179	190	200	207	215
290	331	337	344	350	357	4	12	22	32	47	66	95	127	157	175	189	200	209	217
300	335	341	347	353	0	7	14	22	31	42	56	75	104	138	166	185	199	210	222
310	339	345	350	357	3	10	16	24	32	41	51	65	84	114	146	174	194	209	220
320	343	349	355	1	7	13	19	26	33	41	50	61	74	94	119	156	183	205	219
330	346	353	359	5	11	17	23	29	36	43	51	60	79	83	102	130	164	192	215
340	351	356	3	8	14	21	26	33	39	46	53	60	70	80	92	112	139	174	203
350	355	1	7	13	18	24	30	36	42	48	55	62	70	79	89	102	121	147	184
Mean longitude in degrees.	190 days.	200 days.	210 days.	220 days.	230 days.	240 days.	250 days.	260 days.	270 days.	280 days.	290 days.	300 days.	310 days.	320 days.	330 days.	340 days.	350 days.	360 days.	
0	194	223	244	259	270	280	288	296	302	309	315	321	328	334	339	345	351	357	
10	167	201	224	254	270	281	290	298	305	312	319	325	332	338	344	349	355	1	
20	150	177	211	244	264	280	291	300	308	315	322	329	335	342	348	354	359	5	
30	141	158	185	221	254	275	290	301	310	318	326	333	340	345	352	357	4	10	
40	137	151	168	197	231	265	286	300	311	320	328	336	342	350	355	2	7	13	
50	137	147	160	179	207	242	275	296	311	321	330	338	346	353	359	5	11	17	
60	138	147	157	170	188	217	252	284	306	320	331	340	348	356	2	6	16	21	
70	148	149	157	167	180	199	228	263	295	316	330	341	350	358	6	12	19	25	
80	143	150	158	167	177	191	208	235	275	305	326	341	351	0	9	16	22	29	
90	146	153	160	168	177	187	200	219	247	288	316	336	351	1	10	18	25	32	
100	150	156	163	171	178	186	198	210	229	258	297	326	346	0	11	20	28	35	
110	154	160	166	173	180	188	197	207	220	240	268	307	334	356	10	21	30	38	
120	157	163	170	176	183	190	198	207	217	230	250	279	321	344	6	20	31	40	
130	161	167	173	180	187	193	200	208	217	228	241	262	289	327	356	16	30	41	
140	166	171	177	183	190	196	203	210	218	227	238	252	270	300	332	6	25	39	
150	169	175	182	187	194	200	206	213	220	228	237	248	262	280	310	342	16	35	
160	174	180	185	192	197	204	200	218	223	231	238	248	257	272	290	320	355	26	
170	177	183	189	195	202	207	218	220	226	234	241	249	258	268	282	300	329	4	
180	182	188	193	199	205	211	217	224	230	236	243	251	259	268	278	292	311	341	
190	186	192	198	204	209	215	222	227	234	240	247	254	261	269	278	288	301	319	
200	190	196	202	208	213	220	225	232	237	244	250	257	264	271	279	288	298	312	
210	195	200	206	212	218	223	231	236	242	248	254	261	267	274	281	289	298	308	
220	199	208	210	216	222	228	233	239	245	252	258	264	271	277	284	291	299	308	
230	202	209	215	220	226	232	238	244	250	256	262	268	274	281	287	294	301	309	
240	207	213	219	225	230	236	242	248	254	260	266	272	278	284	291	297	304	311	
250	211	217	223	229	235	240	246	252	258	264	270	276	282	288	294	301	307	314	
260	214	221	227	233	239	245	251	257	262	268	275	280	286	292	298	304	311	317	
270	218	224	231	236	243	249	255	261	267	273	278	284	290	296	302	308	315	321	
280	222	228	234	241	247	253	259	265	271	277	283	288	294	300	306	312	318	325	
290	225	232	238	244	249	255	261	267	273	278	284	289	295	301	307	313	319	326	
300	227	235	241	248	254	261	267	273	279	285	291	297	303	308	314	320	326	332	
310	229	237	245	252	258	265	271	278	283	289	295	301	307	313	319	324	330	336	
320	230	239	248	255	262	269	275	281	288	293	299	305	311	317	323	329	334	340	
330	230	240	249	258	265	272	279	285	291	298	303	310	315	321	327	333	339	344	
340	225	239	260	260	268	275	282	289	295	301	308	314	319	325	331	337	343	349	
350	213	2																	

TABLE P.E.—SATURN EYE TABLE

Showing actual longitude (in ordinary type) corresponding to mean longitude (in heavy type) for every ten complete days of the Indian Solar Year.

Mean longitude in Degrees.	0 day.	10 days.	20 days.	30 days.	40 days.	50 days.	60 days.	70 days.	80 days.	90 days.	100 days.	110 days.	120 days.	130 days.	140 days.	150 days.	160 days.	170 days.	180 days.
	Degrees.																		
0	353.7	354.7	355.6	356.6	357.4	358.1	358.9	359.3	359.7	360.0	359.7	359.4	359.2	358.5	357.7	356.7	355.6	354.2	353.1
10	3.5	4.5	5.4	6.3	7.2	8.0	8.9	9.4	10.0	10.5	10.4	10.6	10.5	10.0	9.3	8.7	7.6	6.4	5.3
20	13.2	13.7	15.1	16.2	16.7	18.1	19.0	19.7	20.4	21.2	21.4	21.7	21.9	21.6	21.1	20.6	19.7	18.7	17.7
30	23.3	24.3	25.2	26.2	27.2	28.1	29.3	30.2	31.1	31.9	32.2	32.7	32.9	32.9	32.8	32.5	31.8	30.9	30.2
40	33.5	34.5	35.3	36.4	37.4	38.4	39.4	40.3	41.3	42.2	42.8	43.5	44.0	44.1	44.0	44.2	43.8	43.2	42.5
50	44.0	45.0	45.9	46.7	47.7	47.8	49.6	50.6	51.6	52.6	53.4	54.2	54.7	55.1	55.4	55.7	55.5	55.2	54.6
60	54.5	55.4	56.1	57.0	58.0	58.9	59.9	60.9	62.0	63.0	63.8	64.8	65.6	66.1	66.6	67.0	67.0	67.2	66.8
70	65.5	66.2	66.7	67.5	68.5	69.5	70.2	71.3	72.3	73.6	74.2	75.2	76.1	76.9	77.3	78.1	78.4	78.5	78.6
80	76.5	77.0	77.4	78.0	78.7	79.6	80.4	81.4	82.5	83.6	84.5	85.5	86.5	87.3	88.0	88.8	89.2	89.6	89.8
90	87.5	87.8	88.1	88.5	88.9	89.2	89.6	91.4	92.7	93.5	94.5	95.5	96.5	97.3	98.3	99.1	99.7	100.2	100.5
100	98.9	99.0	98.9	99.0	99.7	100.2	100.7	101.6	102.5	103.5	104.5	105.5	106.5	107.5	108.3	109.3	110.0	110.7	111.4
110	110.3	110.0	109.7	109.6	110.1	110.4	110.9	111.7	112.5	114.0	114.2	115.2	116.1	117.1	118.0	119.0	119.8	120.5	121.4
120	121.7	121.3	120.8	120.4	120.7	120.9	121.1	121.7	122.4	123.1	124.0	125.0	126.0	126.9	127.8	128.7	129.6	130.4	131.4
130	132.9	132.3	131.8	131.1	131.1	131.2	131.2	131.7	132.3	132.7	133.5	134.3	135.3	136.3	137.2	138.2	139.1	139.9	140.9
140	144.1	143.3	142.4	141.7	141.5	141.2	141.0	141.4	141.8	142.1	142.8	143.5	144.4	145.3	146.2	147.3	148.3	149.3	150.2
150	155.3	154.4	153.4	152.4	152.0	151.6	151.2	151.4	151.7	151.8	152.3	153.0	153.7	154.5	155.4	156.4	157.4	158.4	159.2
160	166.1	165.0	163.9	163.0	162.3	161.7	161.2	161.1	161.1	161.3	161.7	162.2	162.7	163.5	164.2	165.1	166.0	166.8	167.9
170	176.7	175.6	174.5	173.5	172.8	172.0	171.2	171.0	170.9	170.7	170.9	171.2	171.7	172.4	173.1	173.9	174.8	175.9	176.5
180	187.1	186.0	184.8	183.7	182.9	182.0	181.0	180.7	180.4	180.2	180.0	180.2	180.5	181.1	181.7	182.4	183.4	184.2	185.0
190	197.3	196.1	194.9	193.9	192.9	192.0	190.9	190.4	189.9	189.3	189.2	189.2	189.3	189.8	190.3	190.9	191.7	192.5	193.3
200	207.3	206.3	205.1	204.1	203.1	202.0	200.8	200.2	199.5	198.8	198.5	198.4	198.4	198.7	199.0	199.3	199.7	200.8	201.6
210	217.0	216.0	215.0	213.9	212.7	211.5	210.5	209.7	209.0	208.2	207.8	207.4	207.6	207.5	207.6	207.8	208.4	209.8	209.6
220	226.5	225.6	224.6	223.7	222.6	221.4	220.5	219.6	218.7	217.7	217.1	216.6	216.3	216.3	216.2	216.4	216.9	217.5	218.0
230	235.9	235.4	234.8	233.3	232.3	231.0	230.0	229.0	228.0	226.8	226.3	225.7	225.1	225.0	224.8	224.8	225.2	225.5	226.1
240	244.9	244.4	243.7	243.0	242.4	241.0	240.0	239.8	238.7	237.6	237.0	236.4	235.7	235.4	234.4	233.7	233.5	233.8	234.0
250	254.0	253.5	252.9	252.4	251.4	250.4	249.6	248.6	247.6	246.5	245.4	244.3	244.6	244.2	243.2	242.7	242.4	242.4	242.6
260	263.2	262.8	262.4	262.0	261.1	260.1	259.2	258.1	257.0	256.0	254.9	254.0	253.0	252.5	252.0	251.3	251.4	251.3	251.2
270	271.9	271.8	271.6	271.4	270.7	269.9	269.2	268.1	267.0	265.9	265.0	263.9	262.8	262.1	261.3	260.6	260.4	260.1	260.0
280	280.8	280.8	280.7	280.8	280.2	279.5	279.0	278.0	277.0	275.3	274.8	273.7	272.6	271.7	270.8	269.9	269.5	269.1	268.8
290	289.8	289.9	289.9	290.1	289.7	289.1	288.7	287.8	287.0	285.0	284.8	283.6	282.7	281.7	280.6	279.7	279.2	278.6	278.3
300	298.5	298.9	299.1	299.4	299.3	298.9	298.7	297.9	297.0	296.5	295.3	294.2	293.0	292.0	291.0	290.0	289.2	288.5	287.6
310	307.5	307.9	308.3	308.0	308.9	308.8	308.6	308.0	307.4	306.7	306.6	305.8	304.6	302.5	301.2	300.1	299.2	298.3	297.5
320	316.5	317.2	317.8	318.3	318.4	318.6	318.7	318.3	317.8	317.4	316.4	315.5	314.5	313.4	312.1	311.0	309.9	308.8	307.8
330	325.5	326.3	327.5	327.7	328.1	328.3	328.7	328.5	328.3	327.9	327.0	326.2	325.3	324.2	322.9	321.9	320.8	319.6	318.5
340	334.9	335.7	336.6	337.3	337.9	338.3	338.7	338.7	338.7	338.5	338.0	337.3	336.6	335.6	334.9	333.1	332.0	330.7	329.7
350	344.2	345.1	346.0	346.9	347.6	348.2	348.7	348.9	349.2	349.2	348.7	348.3	347.9	347.0	346.0	345.0	343.8	342.6	341.3

Mean longi- tude in Degrees.	190 days.	200 days.	210 days.	220 days.	230 days.	240 days.	250 days.	260 days.	270 days.	280 days.	290 days.	300 days.	310 days.	320 days.	330 days.	340 days.	350 days.	360 days.
	Degrees.																	
0	351.9	350.0	349.5	348.7	347.9	347.3	347.2	347.1	346.9	347.3	347.6	347.9	348.7	349.4	350.2	351.2	352.1	353.1
10	4.2	2.9	1.5	0.5	359.6	358.7	358.2	357.9	357.3	357.6	357.8	358.0	358.7	359.2	0.0	0.9	1.9	2.8
20	16.5	15.2	13.9	12.8	11.7	10.5	9.9	9.2	8.5	8.6	8.6	8.6	9.2	9.7	10.1	11.0	11.8	12.7
30	29.0	27.8	26.5	25.3	24.2	22.9	22.0	21.1	20.3	20.0	19.7	19.5	19.8	20.2	20.5	21.3	22.0	22.7
40	41.5	40.4	39.2	37.9	36.7	35.3	34.3	33.3	32.3	31.7	31.1	30.6	30.9	30.8	31.0	31.7	32.4	33.0
50	53.9	52.9	51.9	50.7	49.6	48.1	47.0	45.8	44.6	43.9	43.1	42.5	42.4	42.3	42.1	42.6	43.0	43.5
60	66.2	65.3	64.6	63.6	62.7	61.3	60.2	59.0	57.5	56.6	55.6	54.7	54.2	53.8	53.4	53.7	54.0	54.2
70	78.1	77.6	77.2	76.1	75.2	74.1	72.8	71.5	70.3	69.2	68.0	66.8	66.2	65.3	65.1	65.2	65.2	65.2
80	89.7	89.4	89.0	88.3	87.7	86.5	85.3	84.1	83.1	81.9	80.6	79.4	78.6	77.7	76.9	76.7	76.5	76.2
90	100.9	100.8	100.6	100.2	99.6	99.0	97.9	96.8	95.8	94.4	93.1	91.8	90.9	89.8	88.8	88.4	87.9	87.3
100	111.6	111.8	111.9	111.7	111.4	110.8	110.0	109.0	107.9	106.8	105.5	104.2	103.2	102.0	101.0	100.4	99.6	98.9
110	121.9	122.2	122.6	122.8	122.5	122.2	121.4	120.8	120.2	119.1	118.0	116.6	115.5	114.2	113.0	112.1	111.3	110.6
120	132.0	132.5	133.0	133.2	133.3	133.2	132.8	132.3	131.6	130.6	129.5	128.3	127.3	126.1	124.9	124.0	123.2	122.0
130	141.6	142.2	142.9	143.3	143.6	143.7	143.4	143.2	142.8	142.0	141.0	140.3	139.2	137.9	136.7	135.7	135.2	134.4
140	151.0	152.1	152.5	152.9	153.3	153.9	153.8	153.7	153.6	152.9	152.2	151.3	150.3	149.2	148.1	146.7	145.7	144.5
150	160.1	161.0	161.7	162.4	162.9	163.4	163.5	163.6	163.2	162.7	162.1	161.1	160.2	159.2	158.2	156.7	155.7	154.5
160	168.8	169.7	170.5	171.2	172.0	172.5	172.8	173.0	173.3	173.1	172.8	172.6	171.8	170.9	170.0	168.9	167.8	166.6
170	177.6	178.3	179.3	180.1	180.9	181.7	182.2	182.6	183.0	182.9	182.8	182.4	181.9	181.1	180.5	179.5	178.5	177.2
180	186.0	186.8	187.7	188.6	189.4	190.1	190.7	191.2	191.8	192.0	191.9	192.0	191.5	190.9	190.6	189.7	188.7	187.7
190	194.2	195.1	195.9	196.8	197.6	198.4	199.0	199.7	200.6	200.8	201.0	201.2	200.9	200.7	200.3	199.4	198.6	197.7
200	202.6	203.4	204.3	205.3	206.2	206.9	207.6	208.4	209.1	209.6	209.8	210.2	210.2	210.0	209.8	209.1	208.5	207.6
210	210.6	211.4	212.3	213.3	214.2	215.0	215.8	216.7	217.4	217.9	218.2	218.8	218.8	218.9	219.0	218.5	218.0	217.4
220	218.8	219.5	220.3	221.4	222.4	223.3	224.2	225.1	226.0	226.6	227.0	227.6	227.6	227.8	227.8	227.6	227.4	226.7
230	226.8	227.5	228.3	229.2	230.2	231.0	231.8	232.7	233.5	234.4	235.0	235.7	236.0	236.2	236.7	236.5	236.4	236.1
240	235.0	235.6	236.3	237.2	238.0	238.9	239.8	240.7	241.6	242.3	243.0	244.0	244.4	244.8	245.2	245.3	245.3	245.1
250	243.4	243.8	244.3	245.3	246.0	246.9	247.9	248.7	249.7	250.6	251.4	252.1	252.8	253.4	253.8	254.0	254.1	254.1
260	251.7	252.0	252.5	253.3	254.0	254.9	255.9	256.7	257.7	258.6	259.4	260.1	260.9	261.5	262.2	262.4	262.8	263.1
270	260.2	260.5	260.9	261.6	262.4	263.0	263.9	264.9	265.7	266.6	267.5	268.5	269.2	269.9	270.7	271.0	271.6	271.7
280	268.9	269.1	269.3	270.0	270.6	271.3	272.2	273.0	273.9	274.9	275.8	276.6	277.4	278.2	279.1	279.8	280.1	280.6
290	278.1	278.0	278.1	278.7	279.3	279.7	280.5	281.4	282.2	283.1	284.0	284.8	285.7	286.7	287.6	288.2	288.0	288.6
300	287.5	287.2	287.1	287.5	288.0	288.2	288.9	289.7	290.6	291.5	292.3	293.4	294.4	295.2	296.0	296.8	297.6	298.2
310	297.2	296.8	296.5	296.7	296.9	297.1	297.8	298.5	299.1	300.1	300.9	301.7	302.7	303.5	304.5	305.1	306.1	307.0
320	307.3	306.7	306.2	306.3	306.3	306.4	306.9	307.6	308.1	308.9	309.6	310.5	311.5	312.5	313.5	314.5	315.3	316.0
330	317.9	317.1	316.3	316.2	316.0	316.5	316.2	316.7	317.2	317.8	318.8	319.4	320.3	321.2	322.4	323.1	324.1	325.0
340	328.9	327.9	326.8	326.6	326.2	325.8	326.3	326.2	326.6	327.3	328.0	328.6	329.6	330.3	331.3	332.3	333.5	334.4
350	340.2	339.2	338.0	337.4	336.9	336.3	336.3	336.4	336.5	337.1	337.3	338.2	339.1	339.9	340.8	341.8	342.8	343.7

TABLE P.F.—Yearly increase in degrees of mean longitude of Mars, Jupiter, Saturn, Mercury and Venus and decrease in mean longitude of Rahu for 500 years.

First New							First New							First New									
Year.	Moon	Mars.	Jup.	Sat.	Mer.	Ven.	Year.	Moon	Mars.	Jup.	Sat.	Mer.	Ven.	Rah.	Year.	Moon	Mars.	Jup.	Sat.	Mer.	Ven.	Rah.	
in Solar							in Solar							in Solar									
Year.							Year.							Year.									
1	18°6	191	30	12	55	225	19	85	19°2	69	60	319	335	61	205	169	19°7	307	89	265	255	257	31
2	7°7	23	61	24	109	90	39	86	8°3	261	90	331	29	286	225	170	8°8	139	119	277	309	122	51
3	26°4	214	91	37	164	316	58	87	26°9	92	120	313	81	151	244	171	27°5	330	149	290	4	347	70
4	15°5	46	121	49	219	181	77	83	16°0	284	151	355	139	17	263	172	16°6	162	180	302	59	212	89
5	1°6	257	152	61	274	46	97	89	5°1	115	181	8	194	242	283	173	5°7	353	210	314	114	78	109
6	23°2	68	182	73	329	271	116	90	23°8	306	211	20	248	107	302	174	24°3	184	240	326	168	303	128
7	12°3	260	212	86	23	136	136	91	12°9	138	242	32	303	332	322	175	13°4	16	271	338	223	168	148
8	1°4	91	213	98	78	2	155	92	2°0	329	272	44	358	197	341	176	2°5	207	301	351	278	33	167
9	20°1	283	273	110	133	227	171	93	20°6	161	302	56	53	63	0	177	21°2	39	331	3	333	258	186
10	9°2	114	303	122	188	92	191	94	9°7	352	333	69	107	288	20	178	10°3	230	2	15	27	123	206
11	27°8	305	334	131	212	317	213	95	28°1	184	3	81	162	153	39	179	27°9	61	32	27	82	340	225
12	16°9	137	4	117	297	182	232	96	17°5	15	33	93	217	18	58	180	18°0	253	62	10	137	214	244
13	6°1	328	35	159	352	47	252	97	6°6	206	64	105	272	243	78	181	7°1	84	93	52	192	79	264
14	21°7	169	67	171	47	273	271	98	25°2	38	94	117	327	103	97	182	25°8	276	123	64	246	304	283
15	13°8	351	95	183	101	138	290	99	14°3	229	124	130	21	334	116	183	14°9	107	154	76	301	169	302
16	2°9	183	126	196	156	3	316	100	3°5	61	155	142	76	199	136	184	4°0	298	184	88	356	35	322
17	21°5	11	156	208	211	228	329	101	22°1	252	185	154	131	64	155	185	22°6	130	214	101	51	260	341
18	10°7	205	186	220	269	93	348	102	11°2	83	215	166	186	289	174	186	11°7	321	245	113	165	125	1
19	29°2	37	217	232	320	319	8	103	6°3	275	246	179	240	154	194	187	0°9	153	275	125	160	350	20
20	18°4	228	217	244	15	184	27	104	18°9	106	275	191	295	20	213	188	19°5	344	305	137	215	215	39
21	7°5	60	277	357	70	49	17	105	8°1	297	306	203	350	245	235	189	8°6	176	336	149	270	81	59
22	26°1	251	398	269	125	274	66	106	26°7	129	337	215	45	110	252	190	27°2	7	6	162	325	306	78
23	15°5	82	338	281	179	139	85	107	15°8	320	7	227	99	335	271	191	16°3	198	36	174	19	171	97
24	1°1	274	8	293	234	5	105	108	4°9	152	37	240	154	200	291	192	5°5	30	67	186	74	36	117
25	23°0	105	39	305	285	239	174	109	23°5	315	68	252	209	65	310	193	24°1	221	97	198	129	262	136
26	12°1	266	69	318	344	95	113	110	12°7	175	98	264	264	291	329	194	13°2	53	127	211	184	127	156
27	1°2	128	99	330	38	320	163	111	1°8	6	129	276	318	156	349	195	2°3	244	158	223	238	352	175
28	19°9	319	130	342	93	185	182	112	20°4	197	159	249	13	21	8	186	21°0	75	188	235	293	217	194
29	9°0	151	160	351	148	51	201	113	9°5	29	189	301	68	246	27	197	10°1	267	218	247	348	82	214
30	27°6	312	190	7	293	276	221	114	28°2	220	313	123	111	47	193	28°7	98	249	259	43	307	233	
31	16°7	174	221	19	258	141	240	115	17°3	52	250	325	177	337	66	199	17°8	290	279	272	97	172	252
32	5°8	5	251	31	312	6	259	116	6°4	243	280	337	232	262	85	200	6°9	121	309	284	152	38	272
33	24°5	196	281	43	7	231	279	117	25°0	71	311	350	287	67	105	201	25°6	312	340	296	207	263	291
34	13°6	28	312	55	62	96	298	118	14°1	266	341	2	342	292	124	202	14°7	144	10	308	262	128	310
35	2°7	219	342	68	117	322	318	119	3°2	97	11	14	36	157	144	203	3°8	335	40	321	316	353	330
36	21°3	51	13	80	171	187	337	120	21°9	280	42	26	91	23	163	204	22°1	167	71	333	11	218	349
37	10°1	242	43	92	226	52	356	121	11°0	120	72	39	146	248	182	205	11°5	358	101	315	66	83	8
38	29°1	73	73	104	281	277	16	122	0°1	311	102	51	201	113	292	206	0°6	189	132	357	121	309	28
39	18°2	265	104	117	336	142	35	123	18°7	143	133	63	256	338	221	207	19°3	21	162	9	175	174	47
40	7°3	96	134	129	30	8	54	124	7°8	334	163	75	310	203	240	208	8°4	212	192	22	230	39	67
41	25°9	288	164	141	85	233	74	125	26°5	166	193	87	5	60	206	209	27°0	44	223	34	285	264	57
42	15°0	119	195	153	140	98	93	126	15°6	357	224	100	60	294	279	210	16°1	225	253	46	340	129	105
43	4°1	310	225	165	145	323	112	127	4°7	188	254	112	115	169	298	211	5°2	66	283	58	34	355	125
44	22°8	142	265	178	249	188	132	128	23°3	20	284	124	169	24	318	212	23°9	258	314	71	89	220	144
45	11°9	335	286	190	304	54	151	129	12°4	211	315	136	224	249	337	213	13°0	89	344	83	144	85	163
46	1°0	165	316	292	359	270	170	130	1°5	43	345	148	279	114	355	214	2°1	281	14	95	199	310	183
47	19°6	356	346	214	54	144	190	131	20°2	234	15	161	334	340	16	215	20°7	112	45	107	254	175	202
48	8°7	187	17	227	198	9	209	132	9°8	65	16	173	28	205	35	216	9°8	303	75	110	308	41	221
49	27°4	19	47	239	163	234	229	133	27°9	257	76	185	83	70	55	217	28°5	135	105	132	3	266	241
50	16°5	210	77	251	218	99	248	134	17°0	88	106	197	138	295	74	218	17°6	326	136	144	58	131	260
51	5°6	42	108	263	273	325	267	135	6°1	280	137	210	193	160	93	219	6°7	158	166	156	113	356	279
52	24°2	233	138	275	328	190	287	136	24°8	111	167	222	247	26	113	220	25°3	349	196	168	167	221	209
53	13°3	64	168	288	22	55	306	137	13°9	302	198	234	302	251	132	221	14°4	180	227	181	222	87	318
54	2°5	256	199	300	77	280	325	138	3°0	134	228	246	357	116	151	222	3°5	12	257	193	277	312	338
55	21°1	87	229	312	132	145	345	139	21°6	325	258	258	52	341	171	223	22°2	203	287	205	332	177	357
56	10°2	279	259	324	187	11	4	140	10°7	157													

TABLE P.F.--Yearly increase in degrees of mean longitude of Mars, Jupiter, Saturn, Mercury and Venus and decrease in mean longitude of Rahu for 500 years--contd

First New								First New								First New															
Year	Moon	Mars	Jup.	Sat.	Mer.	Ven.	Rah.	Year	Moon	Mars	Jup.	Sat.	Mer.	Ven.	Rah.	Year	Moon	Mars	Jup.	Sat.	Mer.	Ven.	Rah.	Year	Moon	Mars	Jup.	Sat.	Mer.	Ven.	Rah.
in Solar	in Solar							in Solar	in Solar							in Solar	in Solar						in Solar	in Solar							
year.								year.								year.							year.								
253	20.3	185	118	212	174	92	218	337	20.8	63	147	158	94	289	14	421	21.1	301	177	104	14	124	240								
254	9.4	17	148	224	229	318	237	333	9.9	255	178	170	149	154	63	422	10.5	133	207	116	69	349	249								
255	28.0	208	179	236	284	183	156	339	28.6	86	208	183	204	19	82	423	29.1	324	237	129	124	214	268								
256	17.1	40	209	248	339	48	276	340	17.7	278	238	195	259	245	102	424	18.2	156	268	141	179	80	288								
257	6.2	231	239	260	33	273	295	341	6.8	109	260	207	313	109	121	425	7.3	317	298	153	233	305	307								
258	24.9	62	270	273	88	138	314	342	25.4	300	299	219	8	334	141	426	26.0	178	328	165	288	170	327								
259	14.0	254	300	285	143	1	334	343	14.5	132	329	231	63	199	160	427	15.1	10	359	178	343	36	346								
260	3.1	85	330	297	198	229	353	344	3.6	323	0	244	118	65	179	428	4.2	201	29	190	38	261	5								
261	21.7	277	1	309	253	94	12	345	22.2	155	30	256	172	290	199	429	22.8	33	59	262	92	126	25								
262	10.8	108	31	322	307	319	32	346	11.4	346	61	268	227	155	218	430	11.9	221	90	214	147	351	44								
263	29.5	299	62	334	2	184	51	347	0.5	178	91	280	282	20	237	431	1.0	56	120	226	202	21	63								
264	18.6	131	92	346	57	50	71	348	19.1	9	121	293	337	246	257	432	19.7	247	151	239	257	81	83								
265	7.7	322	122	358	112	275	90	349	8.2	200	182	305	31	111	276	433	8.8	78	181	251	311	307	102								
266	26.3	154	153	10	166	140	109	350	26.9	32	182	317	86	336	295	434	27.4	270	211	263	6	172	121								
267	17.4	345	183	23	221	5	129	351	16.0	223	212	329	141	201	315	435	16.5	101	242	275	61	37	141								
268	4.5	177	213	35	276	250	148	352	5.1	55	213	241	196	66	334	436	5.6	293	272	288	116	263	100								
269	23.2	8	244	47	331	96	167	353	23.7	246	273	374	251	291	353	437	24.3	124	302	390	170	128	179								
270	12.3	199	274	59	25	321	187	354	12.8	77	303	6	305	136	13	438	13.4	115	333	312	225	363	199								
271	1.4	31	304	72	80	186	206	355	1.9	269	334	18	0	22	32	439	2.5	147	3	324	280	218	218								
272	20.0	222	335	84	135	52	225	356	20.6	100	4	30	55	247	52	440	21.1	338	33	363	335	83	238								
273	9.1	54	5	96	190	277	245	357	9.7	292	34	43	110	112	71	441	10.2	170	61	349	29	308	277								
274	27.8	245	35	108	244	142	264	358	28.3	123	65	55	164	337	90	442	28.9	1	94	1	84	173	276								
275	16.9	76	66	120	299	7	283	359	17.4	314	95	67	219	202	110	443	18.0	192	124	13	139	38	296								
276	6.0	268	96	133	354	232	303	360	6.5	149	126	79	274	68	129	444	7.1	24	155	25	194	264	315								
277	24.6	99	127	145	49	97	322	361	25.1	337	156	91	329	293	148	445	25.7	215	185	38	249	129	344								
278	13.7	291	157	157	103	322	312	362	14.3	169	186	104	23	158	168	446	14.8	47	215	50	303	354	354								
279	2.9	122	187	169	158	187	1	363	3.4	0	217	116	78	23	187	447	3.9	238	246	62	358	219	13								
280	21.5	313	218	182	213	53	20	364	22.0	191	247	128	133	248	206	448	22.6	69	276	74	53	85	32								
281	10.6	145	248	194	268	278	40	365	11.1	23	277	140	188	114	226	449	11.7	261	306	86	108	310	52								
282	29.2	336	278	206	323	143	59	366	0.3	214	308	152	242	339	245	450	0.8	92	337	99	162	175	71								
283	18.4	168	309	218	17	9	78	367	18.9	46	338	165	297	204	264	451	19.4	284	7	111	217	40	90								
284	7.5	359	339	230	72	234	98	368	8.0	237	8	177	352	70	284	452	8.6	115	37	123	272	265	110								
285	26.1	190	9	243	127	99	117	369	26.6	68	39	189	47	295	303	453	27.2	306	68	135	327	150	129								
286	15.2	22	40	255	182	324	137	370	15.8	260	69	201	101	160	323	454	16.3	138	98	147	21	355	149								
287	4.3	213	70	267	236	189	156	371	4.9	91	99	214	156	25	342	455	5.4	329	129	160	76	220	108								
288	28.0	45	100	279	291	54	175	372	23.5	283	130	226	21	250	1	456	24.0	161	159	172	131	86	187								
289	12.1	236	131	292	346	280	195	373	12.6	114	160	238	266	115	21	457	13.2	332	189	184	186	311	207								
290	1.2	67	161	304	41	145	214	374	1.7	305	190	250	321	340	40	458	2.3	183	220	196	240	176	226								
291	19.8	259	191	316	95	10	233	375	20.4	137	221	262	15	205	59	459	20.9	15	256	209	295	41	245								
292	8.9	90	222	328	159	235	233	376	9.5	328	251	275	70	71	79	460	10.0	206	280	221	350	266	265								
293	27.6	282	252	340	205	100	272	377	28.1	160	281	287	125	296	98	461	28.6	38	311	233	45	132	284								
294	16.7	113	282	353	260	325	291	378	17.2	351	312	299	180	161	117	462	17.8	229	341	245	99	357	393								
295	5.8	304	313	5	314	190	311	379	6.3	183	342	311	234	27	137	463	6.9	60	11	257	154	222	323								
296	24.4	136	313	17	9	56	330	380	25.0	14	12	324	289	252	156	464	25.5	252	42	270	209	88	342								
297	13.5	327	13	29	64	281	349	381	14.1	205	43	336	344	117	175	465	14.6	83	72	252	264	313	2								
298	2.6	159	44	42	119	146	9	382	3.2	37	73	348	39	342	195	466	3.7	275	102	291	319	178	21								
299	21.3	350	74	54	173	11	28	383	21.8	228	103	0	93	207	214	467	22.4	106	133	306	13	43	40								
300	10.4	181	104	66	228	237</																									

TABLE

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of L.S.V.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	
	E.g.	Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	S 8	S 18	S 28
1839 Mars	..	149.2	130.7	140.2	142.1	144.7	148.0	151.9	156.4	161.3	166.6	172.3	178.0	184.0	190.3	196.7	203.2	209.9	217.1
Mercury	..	16.5	21.5	16.3	10.7	14.4	26.8	42.8	60.9	79.9	98.3	115.9	131.1	141.8	145.6	137.2	132.7	138.0	150.5
Jupiter	..	170.7	169.4	168.5	167.5	166.7	166.3	166.3	166.5	167.2	168.0	169.1	170.4	172.1	173.8	175.7	177.6	179.7	181.8
Venus	..	27.3	39.4	51.3	63.3	75.2	86.8	98.2	109.6	120.7	131.4	141.8	151.3	160.2	167.9	173.9	177.8	177.8	174.0
Saturn	..	227.8	227.2	226.6	226.0	225.2	224.4	223.7	223.0	222.3	221.7	221.4	221.2	221.0	221.2	221.5	221.8	222.5	223.2
1840 Mars	..	5.3	12.7	19.9	27.3	34.4	41.6	48.8	55.8	62.7	69.3	76.2	83.0	89.2	95.8	102.5	108.8	115.0	120.9
Mercury	..	358.8	352.0	354.1	5.0	20.3	38.1	56.5	75.3	93.2	110.0	121.4	126.1	121.3	115.4	118.9	130.2	145.3	171.3
Jupiter	..	204.8	203.6	202.4	201.0	199.8	198.6	197.6	196.9	196.5	196.5	196.6	197.3	198.1	199.2	200.6	202.2	203.9	205.9
Venus	..	332.2	344.4	358.5	8.9	21.1	33.3	45.6	57.8	69.7	82.4	94.6	106.9	119.1	131.4	143.2	156.0	168.5	180.7
Saturn	..	239.2	238.9	238.5	237.8	237.1	236.4	235.6	234.9	234.2	233.4	232.6	232.5	232.1	232.3	232.3	232.3	232.3	233.6
1841 Mars	..	187.2	183.9	180.4	178.3	177.0	177.2	178.6	181.0	184.3	188.3	192.9	197.7	203.5	209.3	215.0	221.4	227.9	234.5
Mercury	..	334.5	343.3	357.8	15.5	34.2	53.2	71.7	88.5	101.6	108.2	105.0	98.3	99.4	109.7	124.3	141.2	169.0	176.6
Jupiter	..	238.1	237.8	237.0	236.2	235.0	233.7	232.4	231.1	229.9	228.8	228.1	227.7	227.5	227.7	228.3	229.1	230.3	231.6
Venus	..	38.9	41.9	41.1	36.6	30.6	25.8	25.0	28.2	33.9	41.5	50.3	59.8	70.1	80.8	92.0	103.3	115.0	126.9
Saturn	..	250.3	250.0	249.8	249.5	248.8	248.2	247.5	246.8	246.0	245.3	244.6	244.0	244.4	243.3	243.2	243.1	243.4	243.9
1842 Mars	..	20.1	27.3	34.4	41.6	48.4	55.4	62.1	68.9	75.8	82.4	89.0	95.5	102.0	108.4	115.8	126.1	127.4	133.9
Mercury	..	336.1	352.9	11.0	30.0	48.8	66.0	80.5	89.1	88.0	80.7	79.9	88.7	102.5	119.7	137.6	155.5	172.5	188.0
Jupiter	..	269.6	270.3	270.7	270.8	270.6	270.0	269.2	268.0	266.7	265.3	264.0	262.7	261.6	260.9	260.3	260.1	260.2	260.8
Venus	..	9.4	21.7	34.0	46.2	58.4	70.8	82.7	94.7	106.6	118.6	130.4	142.4	154.1	165.5	177.4	188.3	199.4	210.2
Saturn	..	261.3	261.2	261.2	261.1	260.5	259.9	259.3	258.5	257.7	257.0	256.3	255.7	255.0	254.8	254.5	254.1	254.3	254.5
1843 Mars	..	237.3	239.2	240.2	240.1	239.0	237.1	233.7	231.6	229.6	228.8	229.9	230.7	233.5	237.1	241.6	246.6	252.2	257.9
Mercury	..	348.0	7.3	26.0	43.6	58.9	69.1	70.2	63.4	60.5	67.8	81.3	97.8	115.8	134.1	151.8	167.2	180.6	186.9
Jupiter	..	299.0	300.7	302.3	303.4	304.3	305.0	305.2	305.2	304.7	304.0	303.0	301.8	300.3	299.0	297.7	296.6	295.6	294.9
Venus	..	317.0	328.6	340.5	352.4	4.1	16.4	28.1	40.1	52.2	64.4	76.5	88.4	100.5	112.9	125.1	137.5	149.9	162.3
Saturn	..	272.1	272.3	272.4	272.5	272.2	271.8	271.4	270.6	269.8	269.1	268.4	267.7	266.9	266.5	265.0	265.4	265.5	265.4
1844 Mars	..	34.8	41.6	48.4	55.2	61.8	68.6	75.1	81.6	88.0	94.8	101.3	107.5	114.1	120.5	126.7	133.0	139.4	145.9
Mercury	..	3.3	21.2	36.9	48.3	51.5	45.2	41.0	46.6	53.3	75.6	93.6	112.2	130.3	147.1	161.3	169.7	169.2	162.2
Jupiter	..	327.2	329.5	331.6	333.5	335.5	337.1	338.4	339.6	340.5	341.0	341.2	341.0	340.5	339.6	338.6	337.3	336.0	334.5
Venus	..	42.5	53.5	64.2	74.7	84.0	93.1	100.2	105.8	108.4	107.1	102.1	95.1	91.5	91.4	94.5	100.5	108.4	117.0
Saturn	..	283.0	283.2	283.6	283.9	283.8	283.5	283.3	282.7	282.1	281.4	280.6	279.9	279.2	278.5	277.9	277.2	277.0	276.9
1845 Mars	..	268.0	273.9	279.5	284.7	289.8	294.7	298.9	302.4	305.1	306.9	307.6	306.3	304.4	301.8	299.5	298.2	298.1	299.1
Mercury	..	14.8	27.3	32.1	27.7	21.7	25.5	37.3	53.2	71.2	90.0	108.4	125.9	141.0	151.2	153.2	146.7	142.3	148.0
Jupiter	..	354.9	357.2	359.6	2.0	4.4	6.6	8.6	10.7	12.5	14.0	15.4	16.5	17.2	17.7	17.7	17.4	16.8	15.9
Venus	..	350.7	3.2	15.5	28.0	40.2	52.4	64.7	77.3	89.4	101.2	113.8	125.9	138.0	150.0	162.3	174.5	186.6	198.6
Saturn	..	293.8	294.4	295.0	295.5	295.4	295.5	295.5	295.0	294.5	294.1	293.3	292.5	291.6	290.9	290.3	289.7	289.3	288.9
1846 Mars	..	49.6	55.9	62.3	68.7	75.0	81.4	87.7	94.0	100.4	106.8	113.1	119.6	125.7	132.2	138.6	145.3	151.3	157.8
Mercury	..	12.8	10.2	3.2	4.7	15.5	30.7	48.6	67.3	86.3	105.8	120.1	132.4	146.4	161.7	175.6	188.7	140.0	154.8
Jupiter	..	22.6	24.9	27.3	29.7	32.1	34.5	36.8	39.2	41.4	43.5	45.5	47.4	49.0	50.6	51.7	52.6	53.2	53.4
Venus	..	318.3	325.1	333.4	342.5	352.6	3.3	13.9	25.1	36.4	48.1	59.9	71.5	83.3	95.2	107.2	119.5	131.7	144.0
Saturn	..	304.7	305.4	306.2	306.9	307.1	307.3	307.5	307.2	306.9	306.6	306.9	305.4	304.6	303.8	303.0	302.2	301.7	301.2
1847 Mars	..	290.3	297.3	304.4	311.5	318.5	325.4	332.3	338.8	345.2	351.4	357.1	2.6	7.5	11.8	15.3	17.9	18.9	18.7
Mercury	..	345.5	344.7	353.3	8.2	25.6	44.3	63.4	81.7	98.6	112.0	118.7	115.8	108.7	109.4	119.6	134.0	150.7	168.4
Jupiter	..	50.2	52.2	54.3	56.5	58.7	60.9	63.4	65.7	68.0	70.4	72.7	74.8	77.0	79.0	80.9	82.5	84.1	85.3
Venus	..	27.9	36.0	51.9	63.9	75.7	87.3	98.7	110.0	121.1	131.7	142.0	151.3	160.0	170.4	173.0	175.8	175.4	175.6
Saturn	..	315.7	316.6	317.7	318.4	318.8	319.4	319.9	319.8	319.6	319.6	319.0	318.5	317.9	317.1	316.3	315.5	314.8	314.1
1848 Mars	..	64.4	70.3	76.1	82.2	88.3	94.3	100.3	106.5	112.6	118.9	125.2	131.3	137.7	144.1	150.4	157.0	163.3	169.9
Mercury	..	332.8	346.0	3.0	21.4	40.5	59.3	76.5	91.0	99.7	98.7	91.7	90.2	99.0	112.8	129.5	147.1	165.0	182.2
Jupiter	..	78.9	80.1	81.6	83.2	85.0	87.1	89.0	91.2	93.5	95.8	98.0	100.3	102.6	104.7	106.9	109.1	111.1	112.9
Venus	..	332.6	345.0	357.2	9.6	21.7	33.9	46.1	58.0	70.7	83.0	95.1	107.1	119.7	132.0	144.0	156.6	169.1	181.3
Saturn	..	326.9	327.9	329.0	330.0	330.7	331.3	332.0	332.2	332.4	332.5	332.1	331.8	331.4	330.7	330.6	329.1	328.3	327.5
1849 Mars	..	309.2	316.8	324.4	332.1	339.6	347.0	354.3	1.5	9.0	15.8	22.7	29.4	35.6	41.7	47.6	53.0	57.4	62.7
Mercury	..	340.6	358.7	17.6	36.3	54.2	69.4	79.6	81.0	74.2	71.2	78.5	91.4	107.6	125.3	143.9	161.3	177.3	190.0
Jupiter	..	109.3	109.5	110.0	113.3	114.9	116.6	118.4	120.4	122.6	124.8	126.9	129.1	131.4	133.6	135.7	137.9		
Venus	..	37.5	39.6	38.1	32.6	26.7	22.8	23.3	27.0	33.1	41.2	50.1	59.9	70.4	81.2	92.2	103.6	115.4	127.1
Saturn	..	338.1	339.3	340.4	341.6	342.5	343.3	344.3	344.8	345.3	345.6	345.4	345.3	345.2	344.5	343.9	343.2	342.5	341.7
1850 Mars	..	80.6	85.7	90.9	96.5	101.9	107.9	113.6	119.3	125.4	131.4	137.5	143.8	150.1	156.1	162.9	169.2	175.8	182.5
Mercury	..	354.9	13.5	31.6	47.4	59.1	62.6	56.8	52.0	37.1	69.8	85.9	103.8	122.2	140.4	156.7	170.8	179.1	178.7
Jupiter	..	141.7	140.9	140.4	140.9	140.9	141.7	142.7	144.0	145.4	147.2	149.1	151.0	153.0	155.1	157.3	159.5	161.7	
Venus	..	10.0	22.3	34.5	46.8	59.2	71.4	83.2	95.4	107.2	119.2	131.2	142.7	154.4	166.1	177.7	188.7	199.6	210.2
Saturn	..	349.7	351.0	352.3	353.5	354.6	355.7	356.7	357.4	358.0	358.7	358.8	359.0	359.1	358.6	358.2	357.7	356.9	356.1
1851 Mars	..	326.7	334.5	342.3	349.9	357.5	5.2	12.5	19.8	27.1	34.3	41.8	48.1	54.6	61.2	67.6	73.7	79.7	85.3
Mercury	..	9.0	25.4	38.1	44.0	39.1	33.1	36.4	47.8	63.5	81.5	100.2	118.4	135.8	150.8</				

P.G.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 6	Mr 16	Mr 26	Ap 5
223-8	230-8	238-1	245-3	252-9	260-4	268-4	275-7	283-6	1840	291-3	299-1	307-0	314-8	322-5	330-4	338-2	345-9	353-6	1-1
166-1	183-2	200-7	217-6	232-9	244-9	249-9	246-9	239-0		240-4	250-6	263-3	281-7	299-6	317-6	334-7	349-8	0-3	2-0
184-0	186-3	188-4	190-5	192-7	194-9	196-9	198-9	200-6		202-2	203-7	205-0	205-9	206-5	207-0	207-1	206-7	206-2	205-3
168-5	163-6	162-2	164-8	170-3	178-0	186-9	196-7	207-2		218-2	229-7	241-1	253-1	265-0	277-1	289-3	301-4	313-5	325-8
225-9	225-0	226-0	227-0	228-2	229-4	230-5	231-6	232-8		233-9	234-9	235-9	236-9	237-5	238-1	238-8	238-9	239-1	239-2
																Mr 7	Mr 17	Mr 27	Ap 6
127-3	133-3	139-0	144-8	150-5	156-2	161-5	166-7	171-9	1841	176-5	180-0	185-0	188-3	191-3	193-2	193-9	193-7	191-8	189-2
179-2	197-3	213-3	226-3	233-9	232-5	225-2	223-0	230-7		244-7	260-8	278-5	296-2	313-5	328-8	340-0	344-0	336-3	333-0
207-9	209-9	212-1	214-3	216-5	218-7	220-9	223-2	225-3		227-4	229-4	231-2	232-9	234-5	235-8	236-7	237-6	238-1	238-1
193-2	205-8	218-0	230-5	242-8	255-2	267-5	279-6	292-1		304-0	315-6	327-5	339-2	350-3	0-9	11-2	20-7	29-3	36-0
234-1	235-0	235-9	236-9	238-0	239-1	240-3	241-5	242-6		243-8	244-8	245-8	246-9	247-7	248-5	249-3	249-6	249-7	250-3
241-5	248-6	255-7	263-0	270-4	278-2	285-6	293-3	301-1	1842	308-7	316-5	324-2	331-6	339-3	346-9	354-3	1-8	8-8	16-2
193-4	207-6	217-1	217-9	211-0	206-8	212-6	224-9	240-3		257-5	275-0	292-4	308-1	320-5	326-1	321-9	315-6	317-4	328-2
233-2	234-8	236-8	238-9	240-9	243-2	245-4	247-7	250-0		252-3	254-6	256-7	258-9	261-0	262-9	264-8	266-4	267-7	269-0
138-9	150-6	162-8	175-1	187-5	199-8	212-2	224-6	237-2		249-8	262-5	275-2	287-6	300-3	312-8	325-4	338-0	350-3	2-7
244-2	245-2	246-0	246-7	248-0	249-0	250-1	251-3	252-5		253-6	254-7	255-8	257-0	257-8	258-7	259-6	260-1	260-6	261-2
139-9	146-1	152-2	158-3	164-3	170-4	176-2	181-9	188-9	1843	193-7	199-4	204-7	209-9	215-1	220-0	224-6	228-9	232-5	235-8
199-2	202-9	197-5	191-7	194-6	205-2	210-9	236-7	254-1		271-4	287-6	300-8	308-1	306-1	298-5	298-5	307-3	321-8	333-9
261-6	262-7	264-0	265-6	267-3	269-3	271-4	273-5	275-5		278-0	280-3	282-8	285-0	287-4	289-7	292-0	294-2	296-2	298-2
220-2	229-9	238-2	245-1	251-1	251-8	250-1	244-1	240-8		236-6	238-1	243-0	250-0	258-0	266-6	277-6	288-7	299-7	310-9
254-7	255-4	256-1	256-9	257-9	258-9	259-9	261-1	262-2		263-4	264-6	265-8	267-0	267-9	268-9	269-9	270-5	271-3	271-8
																Mr 6	Mr 16	Mr 26	Ap 5
264-1	270-6	277-2	284-1	291-2	298-2	305-5	312-7	319-9	1844	327-2	334-5	341-8	348-9	356-1	3-1	10-3	17-3	24-3	31-0
185-1	176-6	176-7	186-1	199-9	216-3	233-5	250-9	267-5		281-2	290-4	299-5	283-6	279-8	287-4	300-5	316-8	334-9	353-5
291-5	294-5	294-9	295-6	296-6	297-8	299-3	301-1	302-9		304-9	307-1	309-4	311-7	314-1	316-5	319-0	321-3	323-7	326-1
174-8	187-3	200-0	212-3	224-7	237-3	249-8	262-7	275-3		287-7	300-3	312-6	325-0	337-1	349-6	1-4	13-3	25-2	36-6
265-5	266-0	266-6	267-1	268-1	268-9	269-9	271-1	272-3		273-4	274-6	275-8	276-9	278-0	279-1	280-2	281-6	281-9	282-7
																Mr 7	Mr 17	Mr 27	Ap 6
152-1	158-4	164-7	170-9	177-3	183-7	189-9	196-2	202-7	1845	208-9	215-2	221-5	227-7	234-1	240-3	246-5	252-7	258-9	265-0
159-4	166-8	180-0	193-8	213-0	230-4	246-9	261-7	272-3		274-9	268-7	263-8	268-0	279-7	295-3	313-0	331-3	349-5	6-5
333-2	332-1	331-2	330-7	330-4	330-6	331-1	332-2	333-0		334-3	336-0	337-8	339-7	341-9	344-1	346-4	348-8	351-2	353-4
127-2	137-8	148-7	159-9	171-7	183-5	195-2	207-6	219-9		232-1	244-4	256-8	269-4	281-9	294-5	306-9	319-1	331-7	344-1
276-7	277-0	277-4	277-7	278-5	279-4	280-2	281-3	282-4		283-4	284-7	285-9	287-0	288-2	289-5	290-6	291-5	292-4	293-4
301-7	304-9	309-3	313-7	318-9	324-5	330-1	336-0	342-2	1846	348-4	355-4	1-0	7-3	13-8	20-1	26-6	33-1	39-5	46-0
159-9	175-4	192-5	209-9	226-8	242-1	254-0	269-0	284-8		248-1	249-8	259-8	274-4	291-4	309-3	327-7	344-7	0-0	10-7
14-8	13-5	12-1	10-7	9-4	8-4	8-7	7-1	7-0		7-2	7-8	8-7	9-8	11-3	12-9	14-7	16-8	18-9	21-1
210-8	222-6	234-4	246-4	259-4	269-4	280-4	291-1	300-9		310-4	318-2	324-5	328-2	328-2	324-1	317-9	313-1	312-5	315-4
288-3	288-5	288-6	288-7	289-4	290-1	290-6	291-3	292-6		283-7	284-9	296-1	297-2	298-4	299-6	300-9	302-0	303-7	304-1
164-2	170-7	177-1	185-7	190-2	197-0	203-4	210-0	216-8	1847	223-6	230-5	237-4	244-2	251-3	258-1	265-2	272-2	279-4	286-3
171-4	188-9	206-6	222-5	235-7	242-7	241-3	233-8	232-1		240-2	254-0	270-3	287-9	305-8	323-3	338-9	350-5	354-1	349-1
53-4	52-9	52-2	51-1	49-9	48-6	47-2	45-9	44-8		43-8	43-1	42-8	42-8	43-1	43-8	44-8	46-1	47-6	49-2
156-3	168-6	181-0	193-5	206-0	218-6	231-2	243-8	256-6		269-5	281-8	294-3	307-1	319-5	332-0	344-7	357-0	9-3	21-5
300-7	300-6	300-4	300-3	300-8	301-2	301-7	302-6	303-5		304-3	305-4	306-6	307-7	309-0	310-3	311-5	312-8	314-0	315-1
																Mr 6	Mr 16	Mr 26	Ap 5
17-2	14-8	12-2	9-5	8-7	8-2	8-6	10-4	13-0	1848	16-3	20-0	24-2	28-9	33-8	39-1	44-3	49-0	53-8	61-3
186-1	202-6	218-6	226-0	227-0	219-9	216-0	221-7	233-8		249-5	260-7	284-9	301-9	317-8	330-3	336-1	332-7	326-0	327-5
86-4	87-2	87-6	87-6	87-3	86-7	85-8	84-6	83-4		82-0	80-7	79-5	78-4	77-6	77-1	76-9	77-1	77-5	78-4
164-7	160-2	159-6	163-1	169-3	177-5	186-7	196-6	207-3		218-4	230-0	241-4	253-5	265-5	277-6	289-8	301-9	314-1	326-4
313-3	313-1	312-9	312-5	312-7	312-9	313-2	314-0	314-7		315-4	316-5	317-6	318-7	319-9	321-1	322-4	323-6	324-9	326-2
																Mr 7	Mr 17	Mr 27	Ap 6
176-6	183-0	189-7	196-5	203-2	210-2	217-0	224-0	231-1	1849	238-3	245-5	252-8	260-0	267-4	275-1	282-4	289-8	297-4	305-2
197-3	208-5	212-0	206-6	200-7	203-2	214-3	229-3	245-8		263-5	280-8	297-1	310-4	318-0	316-4	309-2	308-2	317-5	331-7
114-7	116-3	117-5	118-6	119-4	119-9	119-8	119-8	119-3		118-4	117-4	116-2	114-9	113-6	112-3	111-2	110-2	109-7	109-4
194-0	206-4	218-8	231-2	243-4	255-8	267-9	280-4	292-4		304-5	316-2	325-0	339-4	350-4	1-1	11-0	20-5	28-7	35-1
326-8	326-3	325-8	325-2	325-3	325-3	325-3	325-8	326-3		327-0	328-0	329-0	330-0	331-2	332-4	333-5	334-9	336-2	337-5
66-9	70-1	72-5	74-0	74-3	73-2	70-8	67-7	64-2	1850	60-8	58-9	58-2	58-5	60-1	62-5	65-9	69-4	73-8	78-2
195-9	193-1	185-7	180-2	176-3	169-1	162-4	142-7	125-2		270-6	290-6	299-7	300-5	293-2	290-2	297-0	310-0	326-8	345-0
140-2	141-9	143-8	145-5	147-0	148-3	149-5	150-2	150-6		150-9	150-7	150-3	149-6	148-5	147-2	146-0	144-4	143-4	142-2
138-6	151-2	163-2	175-4	187-9	200-2	212-6	225-2	237-9		250-3	263-0	275-5	288-3	300-8	313-5	325-9	338-5	351-0	3-4
340-8	343-1	339-5	338-8	338-5	338-2	338-1	338-4	338-8		339-1	339-9	340-8	341-6	342-7	343-9	345-1	346-4	347-7	348-9
189-3	196-1	202-8	209-9	216-8	224-0	231-2	238-4	245-9	1851	253-4	260-7	268-2	276-0	283-6	291-3	299-2	307-0	314-7	322-7
171-3	168-5	176-0	189-2	205-1	222-2	239-4	256-3	271-0		281-4	284-3	278-4	273-2	277-6	289-4	305-1	322-9	341-3	359-5
163-9	166-0	168-1	170-2	172-2	174-0	175-7													

P.G. - Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of L.S.Y.		0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Encl	Ap 11	Ap 21	My 11	My 11	My 12	Je 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10
1852	Mars	160.5	163.9	167.9	172.4	177.2	182.4	188.2	193.9	199.0	204.8	210.5	216.2	222.0	227.8	233.5	239.3	245.1	250.9
	Mercury	16.7	23.9	31.1	38.2	45.3	52.4	59.5	66.6	73.7	80.8	87.9	95.0	102.1	109.2	116.3	123.4	130.5	137.6
	Jupiter	209.5	208.4	207.1	205.8	204.1	202.3	200.4	198.5	196.6	194.7	192.8	190.9	189.0	187.1	185.2	183.3	181.4	179.5
	Venus	13.0	51.2	64.7	71.8	77.1	82.6	89.5	96.4	103.4	110.2	117.2	124.5	131.8	139.0	146.3	153.6	160.9	168.2
	Saturn	13.5	14.1	16.1	17.5	18.0	20.1	21.4	22.5	23.5	24.6	25.2	26.0	26.6	26.8	26.8	26.9	26.5	26.1
1853	Mars	243.5	251.2	258.7	266.1	273.9	281.4	288.7	295.8	302.7	309.5	316.2	322.9	329.6	336.3	343.0	349.7	356.4	363.1
	Mercury	3.5	35.0	43.4	51.8	59.8	67.7	75.6	83.5	91.4	99.3	107.2	115.1	123.0	130.9	138.8	146.7	154.6	162.5
	Jupiter	242.6	242.4	241.8	241.0	240.0	238.7	237.4	236.0	234.8	233.7	232.7	231.6	230.5	229.4	228.3	227.2	226.1	225.0
	Venus	33.3	3.7	16.1	28.6	40.8	53.2	65.3	77.7	89.7	102.0	114.2	126.5	138.6	150.8	163.0	174.9	187.0	199.0
	Saturn	25.9	27.2	28.5	29.7	30.1	32.5	33.9	35.1	36.3	37.5	38.4	39.2	40.1	40.5	40.9	41.3	41.1	41.0
1854	Mars	126.7	127.6	129.6	132.1	135.7	139.8	144.3	149.2	154.5	159.9	165.8	171.6	177.8	184.0	190.4	196.9	203.8	210.5
	Mercury	336.0	342.7	350.3	358.3	366.1	373.9	381.6	389.3	397.0	404.7	412.4	420.1	427.8	435.5	443.2	450.9	458.6	466.3
	Jupiter	273.8	274.7	275.2	275.4	275.4	275.0	274.1	273.1	271.9	270.6	269.3	268.0	266.8	265.8	265.2	264.8	264.8	265.1
	Venus	317.4	321.4	324.9	328.4	332.5	337.4	343.2	349.8	357.2	365.4	374.5	384.6	395.6	407.6	419.6	431.6	443.6	455.6
	Saturn	38.4	39.7	41.0	42.3	43.6	44.9	46.3	47.6	48.9	50.2	51.3	52.4	53.4	54.1	54.8	55.4	55.5	55.5
1855	Mars	359.1	6.8	14.3	21.6	29.1	36.1	43.3	50.3	57.3	64.1	71.1	77.5	84.4	90.9	97.2	103.6	109.8	115.9
	Mercury	334.7	350.8	358.8	367.7	377.1	386.5	395.9	405.2	414.5	423.8	433.1	442.4	451.7	460.9	470.2	479.5	488.8	498.1
	Jupiter	303.0	344.7	306.4	307.7	308.7	309.6	309.9	310.1	309.8	309.3	308.5	307.3	305.0	304.6	303.3	302.0	300.9	300.1
	Venus	28.4	40.4	52.4	64.4	75.8	87.6	99.0	110.8	122.3	133.6	144.9	156.2	167.5	178.8	190.1	201.4	212.7	224.0
	Saturn	51.3	52.6	53.8	54.9	56.2	57.5	58.7	60.2	61.6	62.9	64.1	65.4	66.6	67.4	68.3	69.2	69.6	70.4
1856	Mars	166.3	163.3	161.8	161.2	161.7	163.6	166.5	169.9	174.0	178.6	183.8	189.2	195.1	201.1	207.2	213.9	220.4	227.3
	Mercury	346.3	4.9	23.8	41.9	58.0	70.1	73.8	68.0	62.8	68.1	79.8	95.8	113.6	131.8	149.7	166.1	180.2	188.6
	Jupiter	331.1	333.3	335.5	337.5	339.5	341.2	342.8	344.0	345.1	345.8	346.2	346.1	345.9	345.1	344.2	343.9	343.7	343.0
	Venus	333.3	345.6	358.0	10.2	22.4	34.4	46.8	59.1	71.2	83.5	95.7	108.0	120.2	132.5	144.8	157.1	169.6	181.8
	Saturn	64.5	65.5	66.6	67.6	68.9	70.2	71.4	72.8	74.1	75.4	76.7	78.0	79.3	80.4	81.5	82.5	83.1	83.8
1857	Mars	14.2	21.6	28.7	36.0	42.9	50.2	56.9	63.8	70.6	77.2	83.9	90.6	97.0	103.6	110.2	116.2	122.7	128.8
	Mercury	1.1	19.4	35.8	48.6	54.4	50.5	44.2	47.1	58.3	73.8	91.5	110.1	128.3	145.4	160.8	176.8	192.8	208.6
	Jupiter	358.7	1.1	3.5	6.0	8.2	10.5	12.7	14.7	16.7	18.2	19.7	21.0	21.9	22.4	22.7	22.6	22.1	21.4
	Venus	36.2	37.2	34.9	28.5	22.9	20.3	21.4	26.0	32.7	41.1	50.2	59.9	70.4	81.5	92.7	104.2	115.9	127.8
	Saturn	78.1	78.9	79.7	80.3	81.6	82.8	84.0	85.3	86.6	87.8	89.3	90.6	92.0	93.1	94.3	95.4	96.4	97.2
1858	Mars	220.2	219.5	217.5	215.0	211.8	208.8	207.1	206.1	206.8	208.6	211.3	214.9	219.1	224.2	229.3	235.1	241.3	247.7
	Mercury	13.7	27.4	34.5	32.5	25.4	26.3	36.3	51.5	69.2	87.9	106.2	124.2	140.1	151.9	156.3	151.6	145.3	147.9
	Jupiter	26.4	28.7	31.0	33.4	35.8	38.2	40.5	42.9	45.2	47.3	49.4	51.4	53.0	54.7	55.9	57.0	57.7	58.1
	Venus	10.6	22.9	35.1	47.7	59.8	72.0	83.8	95.9	107.1	119.7	131.7	143.4	154.9	166.6	178.0	189.2	199.9	210.3
	Saturn	91.7	92.2	92.7	93.3	94.4	95.5	96.4	96.9	98.8	100.1	101.5	102.9	104.2	105.4	106.6	107.9	108.9	110.0
1859	Eng.	Ap 19	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
	Mars	29.0	36.2	42.8	49.7	56.6	63.4	70.2	76.7	83.1	89.8	96.4	102.8	109.2	115.7	122.1	128.5	134.7	141.1
	Mercury	14.4	14.5	7.3	5.9	14.9	29.1	46.4	65.0	83.9	102.2	118.8	135.1	151.9	168.2	184.0	199.2	214.7	230.3
	Jupiter	54.1	56.0	58.9	60.1	62.3	64.5	66.9	69.2	71.6	73.9	76.2	78.4	80.6	82.6	84.4	86.4	88.0	89.4
	Venus	317.7	320.6	341.4	353.4	365.4	377.4	389.4	401.4	413.4	425.4	437.4	449.4	461.4	473.4	485.4	497.4	509.4	521.4
	Saturn	105.5	105.7	105.9	106.3	107.1	108.0	108.7	109.8	110.9	112.6	113.4	114.7	115.9	117.2	118.5	119.9	121.0	122.1
1860	Eng.	Ap 11	Ap 21	My 1	My 11	My 21	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10
	Mars	257.5	262.1	266.8	270.8	274.1	276.8	278.1	278.6	278.6	278.6	278.6	278.6	278.6	278.6	278.6	278.6	278.6	278.6
	Mercury	349.9	346.6	353.2	360.5	367.8	375.1	382.4	389.7	397.0	404.3	411.6	418.9	426.2	433.5	440.8	448.1	455.4	462.7
	Jupiter	82.9	84.1	85.4	86.9	88.7	90.6	92.6	94.7	96.9	99.2	101.4	103.6	105.9	108.2	110.4	112.5	114.6	116.5
	Venus	43.2	34.5	64.7	74.8	83.9	92.4	98.4	103.8	108.3	112.7	117.2	121.7	126.2	130.7	135.2	139.7	144.2	148.7
	Saturn	119.4	119.3	119.2	119.3	119.9	120.6	121.1	122.0	123.0	124.0	125.2	126.5	127.7	129.0	130.3	131.6	132.8	134.0
1861	Mars	43.8	50.2	56.7	63.3	69.9	76.4	82.9	89.1	95.7	102.1	108.4	114.7	121.2	127.6	133.9	140.3	146.7	153.0
	Mercury	332.6	344.7	356.8	368.9	381.0	393.1	405.2	417.3	429.4	441.5	453.6	465.7	477.8	489.9	502.0	514.1	526.2	538.3
	Jupiter	113.6	112.7	111.4	110.8	110.9	111.7	112.6	113.5	114.4	115.3	116.2	117.1	118.0	118.9	119.8	120.7	121.6	122.5
	Venus	351.8	4.3	16.6	29.1	41.3	53.7	65.8	77.1	88.4	99.7	111.0	122.3	133.6	144.9	156.2	167.5	178.8	190.1
	Saturn	133.2	132.9	132.6	132.4	132.8	133.1	133.5	134.3	135.1	135.8	137.0	138.1	139.3	140.5	141.8	143.1	144.3	145.6
1862	Mars	282.0	288.8	295.3	302.1	308.6	315.1	321.1	327.0	332.9	338.8	344.8	350.6	356.1	361.6	367.1	372.6	378.1	383.6
	Mercury	338.8	356.5	374.2	391.9	409.6	427.3	445.0	462.7	480.4	498.1	515.8	533.5	551.2	568.9	586.6	604.3	622.0	639.7
	Jupiter	146.3	145.4	144.8	144.4	144.4	144.8	145.5	146.4	147.6	148.0	148.6	149.2	149.8	150.4	151.0	151.6	152.2	152.8
	Venus	316.4	323.9	332.8	342.8	352.8	362.8	372.8	382.8	392.8	402.8	412.8	422.8	432.8	442.8	452.8	462.8	472.8	482.8
	Saturn	146.9	146.4	145.9	145.5	145.5	145.7	145.7	146.3	146.9	147.5	148.5	149.5	150.5	151.7	152.9	154.1	155.4	156.7
1863	Eng.	Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
	Mars	58.5	64.6	70.8	76.8	82.9	89.2	95.5	101.7	107.8	114.2	120.5	126.8	133.1	139.4	145.7	152.0	158.3	164.6
	Mercury	352.6	11.4	29.6	46.5	59.7	65.5	61.7	55.2	58.0	68.5	84.2	101.5	119.8	138.0	155.2	172.4	189.6	206.8
	Jupiter	180.1	178.8	176.5	175.6	175.6	174.9	174.5	174.5	174.5	174.5	174.5	174.5	174.5	174.5	174.5	174.5	174.5	174.5
	Venus	29.0	40.9	52.9	64.8	75.9	87.9	99.4	110.5	121.5	132.6	143.6	154.6	165.6	176.6	187.6	198.6	209.6	220.6
	Saturn	160.3	159.6	159.0	158.4	158.2	158.1	158.0	158.2</										

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
203.5	209.6	216.7	223.9	231.0	238.3	245.7	253.5	261.0	1853	268.7	276.5	284.2	291.9	299.8	307.7	315.6	323.6	331.3	339.3
164.3	181.0	198.4	215.7	231.5	244.5	251.9	259.3	242.5		241.3	249.8	263.2	279.6	297.3	315.5	333.0	348.9	0.9	5.2
211.2	213.2	215.4	217.6	219.8	222.1	224.2	226.5	228.7		230.8	232.7	234.8	236.5	238.1	239.6	240.7	241.6	242.3	242.5
127.4	138.3	149.3	160.4	172.0	184.1	196.0	208.3	220.6		232.7	245.0	257.7	270.1	282.6	295.2	307.6	319.8	332.4	344.8
25.6	24.8	26.1	23.2	22.4	21.7	20.8	20.3	19.8		19.4	19.5	19.7	19.8	20.5	21.2	21.9	23.0	24.1	25.2
107.6	113.5	118.7	124.0	128.8	133.3	137.3	140.9	143.6	1854	145.4	146.4	145.7	143.0	141.3	137.3	133.9	130.6	127.8	126.9
177.6	195.3	211.8	225.7	235.1	235.9	228.9	224.8	230.3		243.2	259.0	276.4	294.2	311.5	327.6	340.3	346.7	343.1	336.3
236.9	238.5	240.4	242.4	244.5	246.7	248.9	251.2	253.5		255.7	258.0	260.3	262.5	264.7	266.6	268.5	270.2	271.8	273.1
210.2	222.9	234.9	246.8	258.3	269.6	280.4	291.1	300.7		309.8	317.2	323.1	325.8	327.7	329.3	315.3	310.8	310.8	314.0
40.7	40.1	39.4	38.7	37.8	37.0	36.1	35.5	34.9		34.2	34.0	33.8	33.4	32.7	32.4	34.6	34.9	35.9	37.8
217.5	224.7	231.7	239.1	246.5	254.0	261.6	269.2	277.1	1855	284.7	292.7	300.6	308.4	316.2	324.0	332.0	339.8	347.4	355.2
191.6	206.5	217.5	221.0	215.5	209.6	212.5	223.5	238.5		255.3	273.0	290.3	306.7	320.2	327.9	326.6	319.3	318.6	327.3
265.8	266.7	267.9	269.5	271.1	273.0	274.0	277.1	279.3		281.6	283.9	286.3	288.6	291.0	293.4	295.7	297.9	300.0	302.0
156.8	169.1	181.5	194.1	206.5	219.3	231.7	244.4	257.1		270.1	282.5	295.0	307.6	320.0	332.5	345.2	357.5	9.8	22.0
55.6	55.2	54.7	54.2	53.4	52.6	51.7	51.0	50.2		49.4	49.1	48.7	48.2	47.3	46.5	45.7	44.4	50.1	50.8
122.0	127.9	133.6	139.3	144.8	150.1	155.3	160.1	164.7	1856	169.1	172.5	175.6	178.0	179.9	179.4	178.2	175.6	172.0	168.0
199.3	205.2	202.1	194.8	195.0	204.4	218.2	234.5	252.0		269.5	286.1	300.3	309.5	316.2	308.4	300.0	307.0	320.2	336.8
299.6	299.4	299.5	300.1	300.9	302.1	303.4	305.0	306.8		308.8	310.9	313.1	315.5	317.9	320.2	322.7	325.5	327.5	329.8
161.3	158.3	158.1	163.0	169.2	177.3	186.7	196.8	207.5		218.6	230.3	241.9	254.0	266.2	278.1	290.1	302.5	314.6	328.9
70.3	70.1	69.9	69.8	69.1	68.4	67.7	66.8	66.0		65.1	64.5	63.8	63.1	62.9	62.8	62.7	63.2	63.6	64.1
234.4	241.4	248.7	256.0	263.4	270.8	278.5	286.3	294.0	1857	301.8	309.6	317.2	324.9	332.6	340.4	347.9	355.4	3.0	10.3
187.9	180.5	178.1	186.0	198.2	214.3	231.2	248.7	265.4		280.5	291.3	294.0	288.0	282.8	287.5	299.0	314.9	332.8	351.2
338.9	337.7	336.7	335.9	335.5	335.5	335.7	338.5	337.4		338.6	340.1	341.9	343.7	345.7	348.0	350.2	352.6	354.9	357.4
194.5	206.7	219.1	231.6	243.7	255.8	268.6	280.7	292.9		304.7	316.7	328.5	339.8	350.7	1.3	10.1	19.8	30.1	34.0
84.5	84.5	84.5	84.5	84.1	83.7	83.2	82.3	81.5		80.7	79.9	79.2	78.4	78.0	77.6	77.1	77.3	77.5	77.6
135.0	140.9	147.1	153.0	159.0	164.8	170.5	176.3	181.8	1858	187.3	192.5	197.2	202.1	208.0	210.5	214.0	217.0	218.0	220.2
161.5	166.8	178.6	194.1	211.0	228.3	245.2	260.6	272.4		277.5	273.6	266.7	268.5	278.6	293.6	310.9	329.0	347.4	5.0
20.4	19.1	17.7	16.3	15.0	13.9	12.9	12.3	11.9		12.0	12.4	13.2	14.2	15.5	16.6	18.6	20.7	22.8	25.0
139.8	152.0	164.0	176.2	188.7	201.0	213.4	226.2	238.6		251.0	263.7	276.4	289.0	301.5	313.7	326.6	339.2	351.7	4.1
98.1	98.4	98.6	99.0	98.8	98.5	98.4	97.7	96.9		96.2	95.4	94.5	93.7	93.1	92.5	91.8	91.7	91.6	91.5
254.3	261.1	268.2	275.4	282.5	290.0	297.3	304.8	312.3	1859	319.8	327.2	334.6	342.1	349.5	356.6	3.9	11.1	18.2	25.3
158.9	173.7	190.5	207.7	225.0	240.9	253.8	260.9	259.2		251.7	250.8	258.7	272.8	289.4	307.3	325.5	343.2	359.0	11.3
58.2	58.1	57.4	56.5	55.3	54.0	52.6	51.4	50.1		49.0	48.2	47.7	47.5	47.8	48.2	49.0	50.2	51.5	53.2
220.1	229.6	236.7	243.1	246.0	246.4	242.2	236.4	231.5		231.1	234.8	240.7	248.8	257.9	267.8	278.1	289.2	300.7	311.8
111.0	111.5	112.1	112.7	112.8	112.8	112.8	112.3	111.7		111.2	110.4	109.6	108.9	108.1	107.3	106.5	106.1	105.8	105.4
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
147.2	153.6	159.7	166.1	172.1	178.5	184.6	190.7	196.7	1860	203.0	209.0	215.2	221.7	227.0	232.9	238.6	244.1	249.6	255.0
169.5	186.0	204.6	221.0	234.9	244.2	244.8	239.6	233.9		240.0	252.5	268.2	285.7	303.6	321.4	337.5	350.6	356.7	354.2
90.6	91.4	91.9	92.3	92.0	91.4	90.8	89.8	88.3		87.2	85.9	84.6	83.5	82.5	81.8	81.5	81.5	81.8	82.5
176.1	188.4	200.9	213.4	226.0	238.6	251.0	264.0	276.7		288.9	301.5	313.8	326.1	338.1	350.3	2.3	14.0	25.9	37.4
123.3	124.1	124.9	125.7	126.0	126.2	126.6	126.4	126.1		125.8	125.1	124.4	123.6	122.9	122.2	121.4	120.8	120.2	119.6
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
283.6	288.7	294.6	300.4	306.8	313.0	319.4	326.3	333.0	1861	339.5	346.5	353.2	0.0	6.8	13.4	20.0	26.9	33.5	40.1
184.1	200.7	215.7	226.6	229.9	224.0	218.3	221.9	232.7		247.5	264.9	282.5	299.9	316.4	330.2	338.3	337.1	329.6	329.0
118.3	119.9	121.3	122.4	123.3	124.0	124.2	124.2	123.9		123.2	122.2	121.1	119.8	118.5	117.2	116.0	114.9	114.2	113.8
127.6	138.3	149.5	160.6	172.6	184.6	196.4	208.6	220.9		233.3	245.7	258.1	270.8	283.1	295.6	308.1	320.5	333.1	345.3
135.2	136.2	137.1	138.2	138.7	139.3	139.4	139.7	139.7		139.6	139.1	138.5	138.0	137.2	136.4	135.6	134.9	134.9	133.5
169.4	165.8	172.4	178.7	185.1	191.7	198.2	204.7	211.3	1862	217.7	224.5	231.2	238.0	244.6	251.4	258.0	264.8	271.7	278.5
196.3	208.6	214.4	210.7	203.5	204.4	213.6	227.4	243.8		261.4	278.8	295.3	309.9	319.2	320.2	313.2	310.3	317.2	330.3
143.4	145.5	147.4	149.1	150.6	152.0	153.2	154.1	154.8		155.1	155.0	154.7	154.1	153.1	151.8	150.6	149.3	147.9	146.9
211.7	223.4	235.2	247.2	258.8	269.8	280.5	290.8	300.6		309.3	316.2	321.5	323.1	321.3	315.5	310.2	307.5	308.9	312.0
146.8	147.9	149.0	150.0	150.9	151.4	152.2	152.4	152.5		152.8	152.4	152.1	151.8	151.1	150.4	149.6	148.9	148.1	147.3
345.6	342.9	342.4	343.0	344.9	347.5	350.9	354.8	359.1	1863	3.9	9.1	14.4	20.0	25.7	31.2	37.3	43.3	49.1	55.1
197.8	196.9	189.4	187.2	194.8	207.5	223.5	240.8	258.2		275.0	289.0	300.6	307.7	297.4	292.5	297.3	308.8	325.1	342.7
167.1	169.2	171.4	173.4	175.5	177.3	179.1	180.8	182.1		183.3	184.2	184.8	185.1	185.1	184.8	184.2	183.1	182.1	180.8
157.6	169.8	182.2	194.8	207.2	219.9	232.3	245.0	257.6		270.6	283.1	295.6	308.9	320.6	333.2	345.7	358.0	10.3	22.5
157.9	159.0	160.4	161.3	162.2	163.0	163.9	164.3	164.7		165.1	165.0	165.0	164.8	164.2	163.6	163.0	162.8	161.4	160.6
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
171.5	178.2	184.9	191.5	198.2	205.0	211.7	218.5	226.0	1864	282.5	239.5	246.7	253.8	261.1	268.5	275.8	283.2	290.5	298.1
175.3	170.9	170.2	187.9	203.2	220.2	237.5	254.6	269.9		282.1	286.9	282.7	276.3	278.2	288.3	303.2	320.7	339.0	3

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of I.S.Y.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170			
1865 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Au 9	Au 19	Au 29	S 8	S 18	S 28
Mercury	74.0	79.6	85.1	90.7	96.5	102.4	108.4	114.3	120.2	126.3	132.5	138.8	145.1	151.5	157.8	164.5	170.9	177.4			
Jupiter	16.5	25.8	25.5	18.6	16.8	25.2	39.7	56.9	75.3	94.0	112.2	128.7	142.2	148.6	146.4	138.9	136.2	148.1			
Venus	247.0	246.8	246.4	245.7	244.8	243.4	242.3	241.0	239.7	238.3	237.5	236.8	236.4	236.4	236.5	237.2	238.1	239.3			
Saturn	34.4	34.8	31.3	22.5	19.5	18.1	20.0	26.1	32.3	40.9	50.2	60.1	70.9	81.7	93.1	104.6	116.5	128.2			
1866 Mars	186.2	185.4	184.6	183.8	183.3	182.8	182.2	182.1	182.1	182.0	182.3	182.8	183.3	184.1	185.0	185.9	187.0	188.1			
Mercury	319.9	327.8	335.5	343.2	350.7	356.3	5.9	13.1	20.4	27.5	34.5	39.1	47.8	54.3	60.4	66.5	72.2	77.6			
Jupiter	7.5	1.1	357.3	4.0	17.1	34.1	52.4	71.4	90.2	107.3	121.7	130.7	130.2	123.1	121.1	128.9	142.0	158.3			
Venus	277.8	278.8	279.6	280.0	280.1	279.8	279.3	278.3	277.1	275.9	274.7	273.3	272.0	270.9	270.1	269.7	269.5	269.6			
Saturn	11.3	23.7	35.7	48.0	60.3	72.5	84.4	96.4	108.2	120.2	132.2	143.7	155.4	166.9	178.3	189.3	200.0	210.4			
1867 Mars	198.6	197.8	197.0	196.3	195.6	194.9	194.3	194.0	193.8	193.4	193.6	193.9	194.2	194.9	195.6	196.3	197.4	198.4			
Mercury	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Au 10	Au 20	Au 30	S 9	S 19	S 29			
Jupiter	92.2	96.4	100.9	105.9	111.2	116.4	122.0	127.5	133.5	139.5	145.3	151.6	157.9	164.1	170.5	177.1	183.9	190.5			
Venus	338.6	343.1	355.4	11.6	29.7	48.6	67.6	86.1	105.7	111.2	118.4	106.7	103.1	108.7	121.1	137.4	155.0	172.5			
Saturn	306.9	308.7	310.5	311.9	313.1	314.0	314.7	314.9	314.9	314.5	313.8	312.9	311.6	310.2	308.9	307.5	306.3	305.4			
1868 Mars	318.3	330.0	342.0	353.8	5.9	17.8	29.8	41.8	53.7	66.0	78.9	90.3	102.4	115.1	127.0	139.4	151.8	164.0			
Mercury	210.7	210.0	209.3	208.5	207.7	206.9	206.2	205.8	205.4	205.0	205.0	205.0	205.0	205.0	205.0	206.1	206.6	207.5			
Jupiter	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Au 9	Au 19	Au 29	S 8	S 18	S 28			
Venus	337.0	344.7	352.5	6.1	7.7	15.2	22.7	29.8	37.0	44.1	50.9	57.8	64.6	71.0	77.4	83.6	89.8	95.9			
Saturn	333.6	349.0	6.7	25.5	44.5	63.0	78.8	91.1	95.3	90.1	84.5	88.9	100.5	116.0	133.3	151.3	169.0	185.3			
1869 Mars	334.9	337.1	339.4	341.5	343.5	345.4	346.9	348.9	349.6	350.4	351.1	351.2	351.1	350.6	349.8	348.6	347.4	346.1			
Mercury	43.5	54.2	64.8	74.7	83.7	91.7	97.7	101.0	101.7	97.3	91.0	85.7	83.8	87.1	91.5	99.1	107.6	117.6			
Jupiter	222.5	221.8	221.2	220.6	219.8	219.0	218.2	217.6	217.0	216.4	216.2	216.1	216.0	216.3	216.6	217.0	217.8	218.6			
Venus	115.5	117.5	120.2	123.8	127.8	132.4	137.3	142.6	148.1	153.7	159.5	165.4	171.9	178.0	184.6	191.1	197.8	204.8			
Saturn	344.4	2.8	21.8	40.2	57.0	70.2	76.4	78.0	66.3	68.3	79.0	94.3	111.6	129.9	147.8	164.9	179.5	189.5			
1870 Mars	2.7	5.9	7.5	9.9	12.3	14.5	16.7	18.8	20.7	22.5	24.1	25.4	26.5	27.2	27.6	27.7	27.3	26.7			
Mercury	352.5	5.0	17.5	29.8	41.9	54.0	66.5	78.8	90.9	103.2	115.4	127.7	139.8	151.8	164.1	176.1	188.2	200.9			
Jupiter	233.9	233.6	233.3	232.3	231.5	230.9	230.0	229.3	228.6	227.8	227.5	227.1	226.9	227.1	227.3	227.4	228.1	228.7			
Venus	353.0	0.6	8.3	15.7	23.1	30.4	37.7	44.9	51.8	58.9	65.6	72.3	78.9	85.5	92.0	98.3	104.5	110.6			
Saturn	359.4	17.4	34.5	48.7	56.8	55.4	48.2	47.8	57.7	72.4	89.6	107.9	126.3	144.0	159.5	171.3	175.7	170.6			
1871 Mars	30.1	32.4	34.7	37.1	39.5	41.8	44.2	46.6	48.8	51.1	53.2	55.2	56.9	58.7	60.1	61.3	62.2	62.8			
Mercury	315.8	323.5	332.8	342.5	353.2	4.1	15.0	26.4	37.9	49.7	61.5	73.3	85.2	96.9	109.3	121.4	133.6	145.9			
Jupiter	245.2	244.9	244.6	244.2	243.5	242.8	242.0	241.2	240.4	239.7	239.2	238.7	238.2	238.1	238.0	238.0	238.0	239.1			
Venus	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Au 10	Au 20	Au 30	S 9	S 19	S 29			
Saturn	148.4	147.1	147.2	148.0	150.3	153.0	156.7	161.1	165.6	170.7	176.2	181.9	187.7	193.9	200.3	207.0	213.7	220.6			
1872 Mars	12.2	27.3	37.4	39.9	29.7	27.9	36.2	50.2	67.4	85.4	104.1	123.3	138.7	152.1	158.1	156.3	148.7	149.2			
Mercury	58.0	59.7	61.7	63.8	65.9	68.1	70.5	72.7	75.1	77.5	79.6	81.9	84.2	86.3	88.3	90.2	91.9	93.3			
Jupiter	29.6	41.6	53.3	65.4	77.1	88.5	99.9	110.9	121.5	131.9	141.5	150.7	158.6	164.5	168.1	168.7	164.4	158.2			
Venus	256.2	256.0	255.8	255.7	255.0	254.4	253.8	253.1	252.3	251.5	250.9	250.2	249.6	249.4	249.2	248.9	249.2	249.6			
Saturn	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Au 9	Au 19	Au 29	S 8	S 18	S 28			
1873 Mars	8.5	15.8	23.3	30.3	37.6	44.8	51.6	58.7	65.7	72.3	78.9	85.5	92.2	98.7	105.0	111.4	117.6	123.9			
Mercury	15.9	18.5	11.9	8.0	14.6	27.8	45.2	62.9	81.9	101.1	117.5	131.7	140.6	140.5	133.4	130.9	138.7	151.8			
Jupiter	87.0	88.0	89.2	90.7	92.3	94.2	96.0	98.2	100.3	102.5	104.7	107.1	109.3	111.5	113.8	115.9	118.0	120.1			
Venus	334.6	346.9	359.1	11.4	23.5	35.7	48.0	60.2	72.5	84.8	97.0	109.2	121.7	133.8	146.2	158.4	170.9	183.3			
Saturn	267.1	267.2	267.3	267.3	266.8	266.3	265.8	265.0	264.2	263.4	262.7	262.0	261.3	261.0	260.6	260.2	260.3	260.4			
1874 Mars	199.6	196.7	193.0	190.2	187.7	186.8	187.1	188.6	191.1	194.6	198.5	203.1	208.5	213.8	219.0	224.0	229.2	234.2			
Mercury	354.9	349.2	353.3	5.8	21.7	39.9	59.0	77.7	95.5	110.8	121.5	123.8	117.4	113.2	118.5	131.1	146.8	164.0			
Jupiter	118.0	118.0	118.2	118.8	119.7	120.8	122.1	123.8	125.5	127.4	129.4	131.4	133.6	135.8	138.0	140.3	142.5	144.6			
Venus	32.6	32.1	28.2	20.2	16.8	15.9	19.0	24.4	31.9	40.9	50.1	60.5	71.0	82.1	93.4	105.1	116.9	128.8			
Saturn	277.9	278.2	278.5	278.7	278.4	278.1	277.8	277.1	276.4	275.1	273.0	274.2	273.4	272.8	273.3	271.7	271.6	271.5			
1875 Mars	23.4	30.4	37.5	44.5	51.3	58.2	65.0	71.7	78.4	84.9	91.7	98.0	104.5	111.0	117.4	123.7	130.0	136.3			
Mercury	332.6	343.7	359.3	17.1	36.0	54.9	73.4	89.6	107.1	124.7	142.7	160.7	178.7	196.7	214.7	232.7	250.7	268.7			
Jupiter	150.9	149.9	149.1	148.7	148.5	148.7	149.3	150.1	151.1	152.4	154.1	155.8	157.5	159.6	161.6	163.7	165.9	168.1			
Venus	11.9	24.3	36.3	48.6	61.0	73.1	85.1	97.2	108.8	120.7	132.7	144.2	155.9	167.6	178.6	189.6	200.1	210.3			
Saturn	288.9	289.3	289.7	290.2	290.0	289.9	289.8	289.2	288.6	288.1	287.3	286.5	285.8	285.1	284.4	283.1	283.4	283.2			
1876 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Au 10	Au 20	Au 30	S 9	S 19	S 29			
Mercury	245.0	248.3	250.8	252.3	253.3	252.8	251.0	248.7	246.1	243.8	242.5	241.5	240.3	240.3	240.9	241.0	240.9	240.5			
Jupiter	337.4	354.6	13.2	32.0	50.6	67.3	80.6	87.3	83.9	77.2	79.0	89.4	103.6	121.4	139.6	157.5	173.8	189.0			
Venus	184.8	183.5	182.2	181.1	180.1	179.3	178.8	178.6	178.7	179.3	180.2	181.1	182.5	184.0	185.7	187.4	189.5	191.6			
Saturn	318.8	330.5	342.5	354.5	6.4	18.3	30.4	42.5	54.2	66.7	78.9	90.9	103.1	115.4	127.7	140.1	152.5	164.9			
1877 Mars	299.7	300.3	300.9	301.6	301.7	301.8	301.9	301.5	301.1	300.8	300.1	299.4	298.6	297.8	297.0	296.3	295.8	295.3			
Mercury	Eng. Ap																				

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27	1866	Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
184-0	190-7	197-6	204-5	211-5	218-5	225-5	232-7	240-1		247-5	254-7	262-3	269-7	277-3	285-0	292-7	300-3	308-3	316-0
162-7	179-0	196-6	213-6	230-1	244-2	253-3	253-8	246-7		243-3	249-0	261-8	277-8	295-4	313-6	331-4	347-8	364-0	7-9
240-7	242-3	244-1	246-1	248-1	250-3	252-5	254-8	257-1		259-4	261-6	264-0	266-2	268-3	270-4	272-4	274-2	275-8	277-2
140-4	152-4	164-6	176-8	189-1	201-6	214-0	226-7	239-1	1867	252-1	264-3	277-0	289-7	302-1	314-8	327-4	339-8	352-3	4-7
189-3	190-5	191-7	192-5	194-0	195-1	196-3	197-1	198-0		198-9	199-4	199-9	200-5	200-5	200-5	200-5	199-9	199-4	198-9
82-6	87-2	91-2	94-8	97-5	99-2	99-9	99-1	97-3		94-3	90-8	86-7	83-8	81-6	81-3	82-1	84-0	86-8	90-2
175-7	193-2	210-1	224-8	235-7	238-5	233-4	227-5	230-9		241-8	257-0	274-1	291-9	309-7	326-5	340-1	348-6	347-8	340-5
270-0	270-9	272-1	273-3	275-0	276-7	278-7	280-8	283-0	1868	285-2	287-5	289-9	292-2	294-6	297-0	299-4	301-6	303-8	305-7
220-0	228-6	235-8	242-7	244-2	243-2	238-5	232-2	228-7		229-2	232-9	239-8	248-2	257-3	267-6	278-1	289-1	300-6	312-0
199-4	200-6	201-8	202-9	204-1	205-3	206-4	207-4	208-4		209-4	210-1	210-7	211-5	211-7	211-9	212-0	211-7	211-4	211-0
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
197-2	204-1	211-1	218-3	225-5	232-6	240-1	247-5	255-0	1869	262-5	270-1	277-9	285-8	293-4	301-5	309-1	317-0	325-0	332-9
189-9	205-4	218-1	224-5	219-6	211-4	213-3	222-6	236-8		253-2	270-8	288-6	305-3	320-0	329-5	330-6	323-6	320-4	327-2
304-7	304-3	304-3	304-7	305-4	306-3	307-5	309-1	310-8		312-7	314-8	317-0	319-2	321-7	324-0	326-4	328-8	331-2	333-6
176-7	189-0	201-7	214-0	226-7	239-2	251-8	264-4	277-1		289-5	301-9	314-3	326-7	339-7	350-9	2-7	14-6	26-3	37-8
209-3	210-5	211-6	212-8	214-0	215-2	216-3	217-4	218-5	1870	219-5	220-4	221-2	222-0	222-4	222-8	223-1	223-2	223-3	222-7
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
101-3	106-9	112-1	166-8	121-5	125-4	129-1	131-6	133-3		133-9	133-4	131-8	128-5	125-0	120-8	117-6	115-4	114-5	114-6
198-9	206-8	206-0	198-4	196-4	196-4	203-9	216-8	232-8		267-4	284-3	299-4	310-5	313-4	307-6	302-3	307-3	319-0	335-0
344-7	343-4	342-2	341-3	340-8	340-5	340-6	341-1	341-9		342-9	344-4	346-0	347-7	349-7	351-8	354-0	356-4	358-8	1-1
127-5	138-6	149-6	161-3	172-9	185-1	197-1	209-3	221-7	1871	233-6	246-2	258-7	271-3	283-8	296-4	308-6	321-2	333-5	346-0
219-4	220-5	221-5	222-5	223-7	225-0	226-1	227-2	228-3		229-5	230-4	231-3	232-2	232-8	233-3	233-9	233-9	234-0	234-0
211-6	218-4	225-6	232-9	240-3	247-8	255-3	263-0	270-6		278-4	286-3	294-0	301-9	309-9	317-7	325-6	333-5	341-3	349-2
191-4	184-6	180-2	185-3	197-1	212-3	229-0	246-7	263-0		279-3	291-4	296-6	292-6	285-9	287-7	298-3	313-2	330-7	349-1
25-8	24-6	23-6	22-0	20-6	19-5	18-3	17-5	17-0	1872	16-9	17-2	17-8	18-6	19-8	21-3	23-0	24-8	26-8	28-9
212-1	224-0	235-7	247-6	259-1	270-0	280-8	290-7	300-5		308-7	315-3	319-9	320-8	317-7	311-8	306-6	304-9	307-0	311-8
229-3	230-3	231-3	232-3	233-5	234-7	235-8	236-9	238-1		239-2	240-2	241-2	242-3	243-0	243-1	244-4	244-7	245-0	245-2
116-6	122-4	128-2	133-6	139-0	144-0	148-7	153-2	157-2		160-6	163-4	165-3	166-1	165-4	163-5	160-5	156-8	152-9	149-5
164-3	167-1	177-4	192-2	208-8	226-2	243-4	259-3	272-4	1873	274-6	277-8	270-6	269-4	278-2	292-0	308-8	327-0	344-7	3-5
62-9	63-0	62-5	61-7	60-6	59-5	58-1	56-7	55-5		54-3	53-3	52-7	52-3	52-3	52-7	53-4	54-3	55-6	57-1
158-3	170-5	182-9	195-7	207-8	220-5	233-0	245-7	258-2		271-0	283-7	296-2	308-9	321-2	334-0	346-3	358-7	11-0	23-0
239-5	240-4	241-3	242-2	243-3	244-4	245-5	246-7	247-9		249-0	250-1	251-2	252-3	253-2	254-1	254-9	255-3	255-7	256-1
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	1874	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
227-4	234-4	241-7	249-2	256-5	264-3	271-9	279-3	287-2		295-0	302-8	310-7	318-4	325-4	334-0	341-7	349-4	357-0	3-8
157-9	172-0	188-3	205-7	223-1	239-4	253-3	262-6	262-8		255-6	262-3	268-7	271-3	282-2	306-0	323-3	341-2	357-9	11-6
94-6	95-5	96-3	96-6	96-7	96-3	95-7	94-8	93-6		92-4	91-1	89-8	88-5	87-4	86-6	86-1	85-9	86-1	86-6
153-5	162-4	154-6	160-3	167-8	176-8	186-5	197-0	208-1	1875	219-3	231-0	242-7	254-8	267-3	279-2	291-2	303-5	315-7	328-1
249-9	250-6	251-3	252-1	253-1	254-1	255-2	256-4	257-6		258-8	260-0	261-3	262-3	263-2	264-1	265-1	265-7	266-3	266-9
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
129-9	136-1	141-9	147-9	153-6	159-4	164-7	170-1	175-5		180-4	185-2	189-6	193-6	197-0	199-7	201-9	202-6	202-6	201-0
167-8	184-6	202-6	219-3	234-2	244-8	247-8	242-0	236-3	1876	240-2	251-3	267-3	283-6	301-7	319-7	336-0	350-4	359-1	358-5
211-8	123-5	125-0	126-3	127-3	128-0	128-5	128-6	128-3		127-9	127-0	125-9	124-7	123-4	122-0	120-7	119-7	118-9	118-2
195-8	208-2	220-2	232-7	245-0	257-0	269-7	281-8	293-0		305-7	317-4	329-2	340-2	351-2	1-3	10-8	19-5	26-3	31-1
260-5	261-0	261-6	262-2	263-2	264-2	265-1	266-3	267-5		268-6	269-7	271-0	272-1	273-2	274-3	275-4	276-2	276-9	277-6
245-0	252-8	260-0	267-3	274-8	282-2	289-9	297-5	305-1	1877	312-7	320-5	327-8	335-5	342-9	350-3	357-8	5-1	12-3	19-6
181-8	199-0	214-5	226-7	232-2	228-8	221-5	222-8	231-9		246-1	260-6	280-5	298-0	316-0	329-5	339-5	340-9	334-2	330-8
146-8	148-8	150-8	152-6	154-2	155-6	156-9	158-0	158-6		159-2	159-2	159-0	158-5	157-5	156-5	155-3	154-1	152-7	151-4
140-7	132-4	104-9	177-3	189-6	202-6	214-3	227-1	239-5		252-2	264-8	277-3	290-2	302-8	316-8	327-3	339-0	352-4	5-4
271-4	271-8	272-2	272-7	273-6	274-5	275-3	276-1	277-1	1878	277-8	279-0	280-2	281-3	282-4	283-6	284-7	285-8	286-8	287-8
143-6	148-7	155-0	161-0	167-0	173-2	179-3	185-2	191-1		197-1	202-9	208-4	214-1	219-6	224-8	229-9	234-6	239-1	243-1
194-7	208-2	216-1	214-8	207-4	204-8	212-9	226-0	242-0		259-2	276-8	293-8	309-2	320-3	323-7	318-0	312-8	316-7	328-9
170-2	172-4	174-6	176-7	178-8	180-7	182-6	184-2	185-7		187-0	188-0	188-7	188-2	189-3	189-1	188-6	187-8	186-7	185-5
219-6	228-2	234-9	240-2	241-6	239-8	233-4	228-2	225-9	1879	227-5	234-2	239-2	248-2	257-4	267-9	278-6	289-7	301-2	312-5
282-9	283-1	283-3	283-6	284-3	285-9	285-8	286-8	287-9		288-9	290-1	291-3	292-6	293-8	295-0	296-1	297-1	298-2	299-2
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
270-2	276-5	282-0	289-6	296-4	303-2	310-2	317-2	324-4		331-5	336-7	345-8	352-9	359-8	6-9	13-7	20-7	27-6	34-5
198-9	200-4	193-6	189-3	194-5	206-3	221-3	238-5	255-9	1880	273-2	288-7	30							

P.G. Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 35, or the method at p. 7 For mean

Day of I.S.Y.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1878 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 52.7	59.1	65.3	71.7	77.8	84.3	90.5	96.7	103.2	109.4	115.7	122.1	128.3	135.3	141.2	147.6	153.9	160.2
Jupiter	.. 15.6	26.9	29.6	22.5	19.2	25.2	38.3	54.8	73.0	91.8	110.2	127.3	141.8	156.1	150.2	142.6	140.7	148.0
Venus	.. 281.9	283.1	284.0	284.6	284.8	284.7	284.2	283.5	282.5	281.2	280.0	278.6	277.2	276.1	275.2	274.5	274.1	274.2
Saturn	.. 315.2	323.3	332.6	342.1	353.5	4.3	15.3	26.7	38.2	50.4	62.0	73.6	85.6	97.6	109.8	122.0	134.1	146.4
1879 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1
Mercury	.. 294.4	301.7	309.0	316.2	323.3	330.4	337.5	344.3	351.2	357.5	3.7	9.6	15.0	20.1	24.3	28.0	30.8	32.3
Jupiter	.. 10.8	5.8	0.2	4.3	10.3	32.1	50.4	69.1	88.2	105.0	121.1	132.0	133.9	127.4	123.2	128.7	140.9	156.4
Venus	.. 310.7	312.7	314.5	316.1	317.5	318.5	319.4	319.9	320.0	319.7	319.1	318.2	317.2	315.0	314.5	313.1	311.8	310.7
Saturn	.. 30.1	42.1	53.9	65.9	77.4	89.0	100.2	111.4	121.9	132.1	141.7	150.4	157.7	163.4	165.6	165.4	160.7	154.9
1880 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 67.8	73.4	79.2	85.1	91.2	97.2	103.3	109.4	115.5	121.4	127.8	134.0	140.4	146.6	153.1	159.6	165.9	172.6
Jupiter	.. 342.0	343.5	344.5	9.7	27.5	46.3	65.4	83.6	99.7	112.0	116.6	111.5	105.5	108.7	120.3	135.5	152.5	170.2
Venus	.. 338.7	341.0	343.3	345.5	347.6	349.5	351.2	352.8	354.1	355.1	355.8	356.1	356.3	355.9	355.2	354.3	353.1	351.7
Saturn	.. 334.7	346.7	359.7	12.0	24.1	36.5	48.6	61.0	73.1	85.4	97.7	109.8	122.3	134.4	146.7	159.0	171.5	183.9
1881 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 313.1	320.6	328.4	336.1	343.0	351.2	358.6	6.0	13.1	20.3	26.9	33.9	40.2	46.5	52.7	58.2	63.5	68.4
Jupiter	.. 333.0	347.3	4.8	23.5	42.5	61.1	77.9	91.3	97.9	95.0	88.1	89.2	99.6	114.3	131.3	149.1	166.8	183.7
Venus	.. 6.3	8.9	11.3	13.6	16.0	18.4	20.6	22.7	24.7	26.6	28.3	29.8	30.9	31.8	32.4	32.5	32.4	32.0
Saturn	.. 30.6	28.1	24.0	17.5	13.8	14.1	18.2	23.8	31.7	40.9	50.4	60.7	71.2	82.8	94.1	105.6	117.5	129.3
1882 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 84.2	89.6	94.3	99.8	105.0	110.6	116.5	122.3	128.3	134.3	140.2	146.2	152.7	159.1	165.5	172.2	178.7	185.4
Jupiter	.. 342.4	0.5	19.4	38.2	55.5	70.0	78.1	77.4	76.2	69.5	70.1	92.7	109.5	126.4	145.9	163.0	178.6	190.1
Venus	.. 33.8	36.1	38.4	40.7	43.1	45.5	47.9	50.2	52.5	54.8	56.9	59.0	60.9	62.6	64.2	65.5	66.5	67.3
Saturn	.. 12.4	24.9	37.0	49.5	63.2	73.6	85.7	97.6	109.9	121.3	133.3	144.6	156.3	168.0	178.8	189.8	200.5	210.1
1883 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1
Mercury	.. 330.3	338.2	346.0	353.7	1.2	8.8	16.1	23.5	30.8	37.9	44.8	51.7	58.2	64.9	71.2	77.4	83.4	89.2
Jupiter	.. 356.8	15.3	32.9	48.1	58.1	59.5	52.6	49.8	57.3	71.0	87.7	105.6	124.0	141.9	158.0	171.2	177.9	175.1
Venus	.. 62.9	63.5	65.4	67.4	69.5	71.6	74.0	76.2	78.6	80.9	83.2	85.5	87.8	89.9	91.9	93.8	95.6	97.1
Saturn	.. 319.1	331.0	343.0	355.0	6.9	18.8	30.8	43.0	55.1	67.2	80.1	91.5	103.6	115.9	128.2	140.6	153.1	165.4
1884 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 106.5	108.3	112.1	116.3	120.9	125.8	131.0	136.5	142.0	147.9	153.9	159.8	166.2	172.4	179.0	185.4	192.1	190.0
Jupiter	.. 10.7	26.4	37.7	40.6	34.6	30.3	35.9	49.0	65.2	83.3	101.0	120.2	137.2	151.5	160.1	160.2	152.6	150.4
Venus	.. 91.2	92.0	93.1	94.4	96.0	97.8	99.7	101.7	103.8	106.0	108.2	110.4	112.7	114.9	117.1	119.3	121.4	123.5
Saturn	.. 44.2	55.1	65.1	74.6	83.4	90.2	95.1	97.2	95.5	89.8	81.2	79.6	81.6	83.8	86.0	88.4	90.7	92.9
1885 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 45.4	46.7	48.0	49.2	50.5	51.8	53.1	54.4	55.7	57.1	58.3	59.4	60.6	61.4	62.2	63.0	63.2	63.5
Jupiter	.. 346.8	354.5	2.2	9.6	17.3	24.6	31.9	39.2	46.2	53.1	60.1	66.7	73.5	79.9	86.5	92.7	98.9	105.0
Venus	.. 16.6	21.9	16.9	11.1	14.5	26.7	42.5	60.6	79.6	98.0	117.7	131.0	141.9	144.0	137.8	133.0	138.0	150.3
Saturn	.. 122.4	122.2	122.3	122.7	123.4	124.5	125.8	127.2	128.9	130.7	132.7	134.7	136.9	139.1	141.2	143.5	145.7	147.9
1886 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 58.4	59.5	60.7	61.8	63.1	64.4	65.7	67.0	68.4	69.8	71.1	72.3	73.5	74.5	75.5	76.5	77.0	77.5
Jupiter	.. 139.9	134.1	135.2	137.5	140.4	146.2	148.6	153.1	158.2	163.4	169.2	175.0	181.1	187.4	193.8	200.4	207.1	213.9
Venus	.. 359.4	352.4	354.2	4.9	20.1	37.9	56.1	74.0	92.9	100.9	121.3	116.4	121.9	115.8	119.0	130.1	145.1	162.2
Saturn	.. 155.5	154.5	153.6	152.9	152.8	152.9	153.1	153.3	154.8	156.0	157.4	159.0	161.0	162.0	164.8	166.9	169.1	171.2
1887 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1
Mercury	.. 314.8	323.1	332.6	343.1	354.1	4.9	15.8	27.2	38.9	50.7	62.4	74.3	86.2	98.1	110.4	122.6	134.8	147.1
Jupiter	.. 71.7	72.6	73.5	74.5	75.7	76.9	78.1	79.5	80.9	82.2	83.5	84.8	86.2	87.3	88.4	89.5	90.3	91.1
Venus	.. 189.6	188.2	186.8	185.8	184.6	183.7	183.0	182.9	182.8	183.2	183.9	184.8	186.0	187.0	189.1	190.9	19.9	194.8
Saturn	.. 30.8	42.7	54.8	66.6	77.7	89.5	100.7	111.7	122.2	132.4	141.7	150.2	157.0	161.9	164.3	162.5	156.8	150.6
1888 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 85.2	86.0	86.7	87.3	88.4	89.5	90.6	91.7	93.3	94.4	95.7	97.0	98.4	99.7	101.0	102.2	103.2	104.2
Jupiter	.. 179.1	174.7	172.0	169.9	169.6	170.6	172.8	175.0	179.4	183.7	188.6	193.7	199.5	205.6	211.5	217.1	224.4	231.8
Venus	.. 355.9	352.6	10.7	29.7	48.5	65.8	80.4	89.3	88.6	81.3	80.1	88.6	102.5	119.5	137.3	155.2	172.4	187.8
Saturn	.. 223.4	222.5	221.5	220.2	219.0	217.6	216.4	215.2	214.3	213.7	213.4	213.8	214.4	215.3	216.5	218.0	219.7	219.7
1889 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 99.0	99.4	99.8	100.3	101.2	102.1	102.9	104.1	105.3	106.5	107.9	109.2	110.5	111.8	113.0	114.3	115.4	116.5
Jupiter	.. 17.5	24.7	31.8	38.9	45.9	53.0	59.7	66.5	73.4	80.1	86.9	93.2	99.8	106.1	113.2	118.9	125.1	131.5
Venus	.. 348.3	34.3	7.0	25.8	43.4	58.9	69.3	70.7	64.0	60.7	67.8	81.1	97.6	115.5	133.8	151.6	166.9	180.6
Saturn	.. 255.7	255.9	255.9	255.4	254.7	253.7	252.5	251.1	249.7	248.5	247.3	246.3	245.7	245.3	245.2	245.6	246.2	247.1
1890 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1
Mercury	.. 28.2	23.5	19.5	14.4	13.2	12.1	16.8	22.8	31.5	40.7	52.3	61.0	71.9	82.9	94.5	96.0	117.9	129.9
Jupiter	.. 112.9	113.0	113.1	113.3	114.1	114.8	115.4	116.5	117.6	118.6	119.9	121.2	122.4	123.7	125.0	126.3	127.5	128.7
Venus	.. 230.0	230.8	230.6	229.4	226.9	224.3	221.4	219.5	218.5	218.7	220.3	223.0	226.5	230.9	235.7	241.2	247.1	253.1
Saturn	.. 3.0	21.0	36.8	48.4	61.9	45.8	41.4	46.7	59.1	75.3	93.3	111.9	130.0	146.9	161.2	169.9	169.7	162.7
Mesh. Vriah. Mith. Keth. Sim. Kan. Tul. Vrsch. Dhan. Mak. Kum. Min. Asvn. Bhar. Krit. Rohi. Mrig. Ardh. Punar. Push. Asles	30	60	90	120														

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
166-8	173-4	179-8	186-5	193-0	199-9	206-4	213-3	219-9	1879	226-0	233-8	240-7	247-7	254-8	261-7	279-0	276-1	283-4	290-8
161-1	177-1	194-3	211-7	228-3	243-1	254-0	256-8	250-8		245-6	249-3	260-7	275-8	293-1	311-3	329-3	346-2	0-6	9-6
274-5	275-1	276-2	277-4	278-9	280-7	282-5	284-5	286-6		288-9	291-3	293-5	295-8	298-3	300-6	303-0	305-3	307-6	309-7
158-7	171-0	183-4	196-4	208-5	221-2	232-7	246-3	259-0		271-8	284-3	296-9	309-6	321-8	334-5	347-0	359-1	11-5	23-5
334-3	333-7	333-1	332-5	332-4	332-3	332-2	332-7	333-2		333-7	334-5	335-1	336-4	337-4	338-6	339-8	341-1	342-4	343-7
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
32-5	31-5	29-3	26-6	24-1	22-4	20-8	20-7	22-1	1880	24-2	26-9	30-3	34-3	38-9	43-6	48-6	53-9	59-2	64-7
172-7	190-3	206-4	223-6	236-0	241-0	238-0	230-6	231-2		241-1	255-3	271-9	289-6	307-6	324-8	339-6	351-0	351-6	345-0
309-9	309-4	309-2	309-4	309-9	310-7	311-8	313-2	314-8		316-6	318-6	320-8	323-1	325-4	327-7	330-1	332-5	334-9	337-4
150-2	150-3	153-5	159-6	167-5	176-9	186-4	197-2	208-2		219-7	231-5	243-4	255-4	267-7	279-9	291-9	304-1	316-4	328-8
348-6	347-8	347-1	346-3	345-9	345-5	345-2	345-4	345-7		346-0	346-7	347-4	348-1	349-2	350-3	351-1	352-7	354-0	355-3
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
179-2	186-9	192-6	199-4	206-2	213-2	220-0	227-1	234-2	1881	241-4	248-9	256-2	263-5	270-9	278-6	286-2	293-8	301-4	309-2
187-8	204-0	217-4	224-0	224-0	216-3	214-4	221-5	235-2		251-3	268-5	286-3	303-6	318-8	330-2	333-9	328-3	322-9	327-0
350-4	349-0	347-8	346-7	346-0	345-5	345-5	345-8	346-5		347-4	348-6	350-1	351-8	353-7	355-8	358-2	0-3	2-5	4-8
196-2	208-6	221-0	233-3	246-6	257-8	270-1	282-4	294-5		306-3	317-8	329-4	340-4	351-2	1-3	10-6	19-0	25-4	29-6
3-4	2-6	1-8	0-9	0-3	359-7	359-2	359-1	359-0		359-0	359-5	0-1	0-6	1-5	2-4	3-4	4-6	5-8	7-1
73-0	76-9	80-2	82-5	83-8	84-0	82-8	80-3	76-8	1882	73-2	70-2	67-9	66-9	67-4	68-8	71-3	74-4	78-2	82-0
198-3	207-9	209-5	202-1	198-2	203-1	215-4	230-9	247-9		265-2	282-6	298-3	310-6	316-2	312-5	305-9	307-3	318-3	333-3
31-2	30-1	28-9	27-6	26-2	24-9	23-7	22-8	22-2		21-9	21-9	22-4	23-1	24-1	25-5	27-0	28-8	30-7	32-8
141-5	153-6	165-6	178-0	190-3	202-8	215-2	227-8	240-4		252-9	265-5	278-3	290-9	303-5	316-0	328-6	341-1	353-1	6-0
18-5	17-7	16-9	16-0	15-3	14-6	13-8	13-1	13-1	1883	12-8	13-0	13-2	13-5	14-4	15-2	15-9	17-0	18-1	19-3
192-2	199-0	205-9	212-9	219-9	227-1	234-3	241-6	249-0		256-5	264-2	271-7	279-4	287-2	294-9	302-8	310-6	318-7	326-3
194-1	189-1	182-9	185-5	190-3	210-8	227-4	244-7	261-8		277-9	291-2	298-5	296-8	289-4	288-9	297-6	311-0	328-6	347-1
67-7	67-7	67-4	66-6	66-0	64-8	63-5	62-2	60-8		59-6	58-5	57-7	57-2	57-0	57-2	57-7	58-6	59-7	61-0
219-7	228-0	234-0	239-3	238-9	235-6	229-1	224-2	223-4		225-5	231-4	238-8	247-7	257-3	267-7	278-7	290-0	301-3	313-3
33-6	32-9	32-3	31-5	30-6	29-9	28-9	28-1	27-8		27-3	27-2	27-2	27-2	27-2	27-7	28-3	28-9	29-9	30-9
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
94-8	100-0	104-8	109-3	113-1	116-4	119-0	120-4	121-1	1884	120-6	118-5	115-6	111-8	107-9	104-8	102-4	101-9	102-4	104-3
167-8	167-1	176-8	190-5	206-7	224-1	241-2	257-8	271-7		280-8	281-7	274-2	271-2	277-8	290-6	306-8	324-7	343-3	1-3
98-3	99-6	100-5	100-9	101-1	101-1	100-5	99-8	98-8		97-5	96-1	94-8	93-1	92-4	91-5	90-8	90-5	90-4	90-9
177-9	190-1	202-8	215-2	227-9	240-5	253-0	265-7	278-2		290-7	303-1	315-4	327-7	339-7	351-9	3-7	15-6	27-3	38-3
48-7	48-4	47-5	47-0	46-2	45-4	44-5	43-8	43-1		42-3	42-0	41-7	41-4	41-7	42-0	42-2	43-0	43-8	44-7
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
205-9	212-8	219-6	226-9	234-4	241-8	249-2	256-3	264-4	1885	272-2	279-7	287-7	295-5	303-4	311-3	319-1	326-1	334-9	342-7
157-4	170-5	186-6	203-7	221-1	237-5	252-3	263-1	266-0		260-2	254-7	258-5	270-1	285-5	302-8	321-0	339-1	356-4	11-0
125-4	127-1	128-7	130-0	131-2	132-0	132-7	133-0	132-7		132-4	131-6	130-7	129-4	128-2	126-9	125-6	124-4	123-4	122-6
128-2	139-6	150-6	162-2	173-5	181-1	198-1	209-7	222-7		235-0	247-5	259-7	272-5	285-0	296-6	309-8	322-4	334-8	347-2
63-7	63-4	63-1	63-3	61-9	61-2	60-4	59-6	58-8		57-9	57-4	56-8	56-2	56-2	56-2	56-2	56-8	57-4	57-9
110-8	116-6	122-1	127-4	132-5	137-3	141-7	145-3	148-7		151-0	152-7	153-2	152-4	150-0	146-6	143-0	139-2	136-2	134-5
165-8	182-9	200-4	217-3	232-7	249-4	259-2	246-6	239-4		240-5	250-5	264-9	281-4	290-3	317-4	334-4	349-7	0-4	2-5
150-0	152-9	154-0	155-9	157-7	159-2	160-6	161-7	162-6		163-1	163-4	163-3	162-8	162-1	161-2	160-0	158-7	157-5	156-1
213-0	224-9	236-5	248-1	259-7	270-3	280-8	290-6	299-5		307-0	312-9	315-9	316-8	309-6	303-1	299-6	300-2	303-9	310-0
78-0	77-9	77-8	77-8	77-2	76-6	76-1	75-2	74-3	1887	73-5	72-8	72-1	71-3	71-0	70-7	70-4	70-8	71-1	71-4
220-9	228-0	235-2	242-5	249-1	257-5	265-1	272-9	280-6		288-3	296-2	304-1	312-0	319-7	327-6	335-5	343-6	350-8	358-5
178-9	197-0	213-1	226-3	234-1	233-0	224-8	223-1	230-5		245-5	260-6	278-2	296-0	313-3	328-7	340-1	344-4	338-9	333-3
173-4	175-6	177-8	179-9	182-0	184-0	185-9	187-7	189-2		190-5	191-7	192-6	193-1	193-4	193-4	192-9	192-3	191-3	190-1
59-4	171-7	184-1	196-7	209-3	221-8	234-3	247-1	259-8		272-5	285-0	297-6	310-2	322-5	335-2	347-7	0-0	12-5	24-1
91-8	92-0	92-2	92-4	92-1	91-8	91-4	90-6	89-8		89-1	88-3	87-5	86-6	86-1	85-6	85-0	85-0	85-0	85-0
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
124-9	130-8	136-6	142-3	148-0	153-6	158-9	163-8	168-7	1888	173-2	177-2	180-9	183-8	186-0	187-4	187-3	185-9	182-9	179-6
193-2	207-5	217-2	218-4	211-5	207-1	212-6	224-7	240-1		257-3	274-8	292-2	307-9	320-5	326-4	332-5	316-0	317-6	328-1
196-9	199-1	201-3	203-5	205-7	207-9	210-1	212-2	214-1		216-1	217-9	219-5	221-0	222-1	223-0	223-7	224-0	224-1	223-6
147-7	148-4	152-4	158-9	167-4	176-6	186-8	197-5	208-7		220-1	232-0	243-9	256-0	268-2	280-5	292-3	304-7	317-0	329-4
105-1	105-5	106-0	106-4	106-4	106-3	106-2	105-6	105-0		104-3	103-5	102-7	101-8	101-1	100-4	99-7	99-5	99-2	98-9
O 8	O 18	O 28	N 7	N 17	N 27	D 7	D 17	D 27		Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
238-3	245-3	252-5	259-8	267-3	274-9	282-4	290-1	297-1	1889	305-5	313-3	321-0	328-7	336-2	344-0	351-4	358-9	6-3	13-7
199-3	203-3	198-1	192-1	194-6	203-1	219-7	276-4	253-9		271-2	287-1	300-8	308-2	306-7	290-4	298-7	307-1	321-6	338-6
221-4	223-4	225-5	227-5	229-9	235-0	234-3	236-5	238-8		211-0	243-2	245-3	247-3	249-1	250-9	252-3	253-6	254-6	255-4
196-7	209-1	221-5	233-8	245-9	258-3	270-5	282-7	294-8		306-5	318-0	329-7	340-4	351-3	1-0	10-3	18-3	24-5	27-8
117-6	118-4	119-1	119-8	119-9	120-1	120-3	119-0	119-5		119-1	118-4	117-7	116-9	116-1	115-3	114-4	113-9	113-5	112-9
137-5	143-7	149-8	155-9	161-9	167-7	173-7	179-4	185-2	1890	193-3	196-2	201-4							

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of I.S.Y.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1891 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 32.1	39.2	45.9	52.7	59.4	66.2	72.9	79.3	85.8	92.4	98.9	105.4	111.8	118.4	124.6	130.9	137.2	143.6
Jupiter	.. 14.7	27.4	32.5	28.3	22.1	25.6	37.2	53.0	71.0	89.7	108.2	125.7	140.9	151.4	153.6	147.4	142.6	147.9
Venus	.. 314.7	316.7	318.5	320.2	321.7	322.9	323.9	324.5	324.8	324.7	324.4	323.7	322.6	321.4	320.1	318.8	317.4	316.2
Saturn	.. 319.9	331.8	345.6	355.6	7.7	19.6	31.7	43.8	55.9	68.0	80.3	92.2	104.0	116.7	129.0	141.4	153.8	166.2
1892 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 262.9	269.0	274.1	278.4	282.9	286.9	290.1	293.4	294.3	294.5	294.0	290.8	287.3	283.3	284.7	285.2	286.7	288.2
Jupiter	.. 13.1	10.8	3.7	4.8	15.3	30.5	48.4	67.1	86.0	103.7	119.9	132.4	137.0	132.5	126.0	128.7	139.9	154.7
Venus	.. 342.7	345.0	347.3	349.6	351.7	353.7	355.5	357.2	358.5	359.7	0.6	1.1	1.3	1.1	0.6	359.7	358.6	357.3
Saturn	.. 44.6	55.2	65.3	75.4	82.8	89.3	94.0	94.4	91.9	85.7	80.1	77.2	78.3	82.9	89.5	98.3	107.7	117.6
1893 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 47.0	53.3	59.9	66.3	72.7	79.1	85.5	92.0	98.3	104.7	111.1	117.3	123.7	130.2	136.5	142.8	149.3	155.7
Jupiter	.. 346.0	344.8	353.2	7.9	25.4	44.0	63.1	81.4	98.5	112.1	119.0	115.8	109.2	109.5	110.5	133.8	150.5	168.2
Venus	.. 10.2	12.6	15.0	17.4	19.7	21.1	24.4	26.6	28.6	30.6	32.3	33.9	35.3	36.3	37.0	37.3	37.6	37.2
Saturn	.. 354.6	7.1	19.0	31.3	44.0	56.3	68.5	80.7	92.9	105.1	117.5	129.6	141.6	153.7	165.6	177.6	189.8	201.6
1894 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 167.4	166.7	166.0	165.4	165.1	164.8	164.5	164.7	164.9	165.2	165.0	166.8	167.5	168.6	169.7	170.7	171.9	173.1
Jupiter	.. 286.7	293.7	300.4	307.4	314.2	320.9	327.4	333.9	339.9	345.9	351.2	356.0	0.2	3.8	6.2	7.4	7.2	5.6
Venus	.. 332.8	345.8	2.7	21.1	40.2	59.0	76.3	91.0	100.0	99.2	92.1	90.4	98.9	112.6	128.3	146.8	164.8	181.1
Saturn	.. 37.7	39.8	42.0	44.4	46.7	49.1	51.5	53.8	56.1	58.4	60.7	62.7	64.8	66.6	68.2	69.6	70.8	71.6
1895 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 314.3	323.0	332.8	343.3	353.9	5.1	16.4	27.7	39.2	51.3	63.0	74.8	86.8	98.7	110.9	123.2	135.5	147.6
Jupiter	.. 180.4	179.6	178.8	178.1	177.6	177.1	176.6	176.6	176.7	176.7	177.2	177.7	178.3	179.2	180.1	181.0	182.2	183.4
Venus	.. 61.7	67.8	73.7	79.8	85.9	91.9	98.2	104.4	110.5	116.9	122.9	129.3	135.6	142.0	148.4	154.7	161.4	167.8
Saturn	.. 340.4	358.5	17.3	36.0	54.0	69.3	79.8	81.5	74.8	71.5	78.9	91.7	107.2	125.2	143.6	161.0	177.1	189.9
1896 Mars	Eng. Ap 11	Ap 21	My 1	My 11	My 21	My 31	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30	Je 10	Je 20	Je 30
Mercury	.. 65.6	67.4	69.2	71.1	73.1	75.2	77.5	79.7	82.1	84.4	86.6	89.0	91.2	93.3	95.4	97.4	99.3	100.9
Jupiter	.. 31.3	43.1	55.3	66.7	78.4	89.3	100.8	111.8	122.1	141.4	141.4	149.6	156.2	160.6	161.7	158.9	152.9	147.5
Venus	.. 193.0	192.2	191.4	190.6	190.0	189.4	188.7	188.5	188.4	188.1	188.4	188.7	189.0	189.8	190.7	191.5	192.6	193.7
Saturn	.. 306.0	313.5	321.1	328.5	336.1	343.6	350.9	358.2	5.1	12.2	18.7	25.4	31.7	37.6	43.4	48.5	53.3	57.6
1897 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 354.7	13.2	31.4	47.3	59.2	63.0	57.5	52.3	57.1	69.6	85.6	103.6	121.9	140.2	156.6	170.8	179.3	179.2
Jupiter	.. 95.4	96.1	97.0	98.3	99.8	101.5	103.3	105.4	107.4	109.5	111.7	113.9	116.2	118.4	120.7	122.9	124.9	127.1
Venus	.. 339.4	348.6	0.9	13.4	25.4	37.7	49.8	62.2	74.4	86.8	98.9	111.2	123.4	135.6	148.1	160.2	172.7	185.1
Saturn	.. 205.2	204.4	203.6	202.9	202.2	201.5	200.7	200.4	200.0	199.6	199.7	199.8	200.0	200.5	201.3	201.8	202.7	203.7
1898 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 77.8	83.0	88.4	94.0	99.7	105.3	111.2	117.2	123.0	129.3	135.4	141.5	147.9	154.2	160.6	167.2	173.6	180.2
Jupiter	.. 8.8	25.3	38.2	44.5	39.8	33.5	36.5	47.7	63.6	81.3	100.0	118.1	135.6	150.7	161.3	163.6	157.3	152.5
Venus	.. 126.8	126.5	126.5	126.7	127.4	129.2	129.4	130.8	132.4	134.1	136.1	138.1	140.2	142.3	144.4	146.7	148.9	151.1
Saturn	.. 25.5	22.1	15.4	10.6	8.8	10.7	15.8	22.9	31.3	40.7	50.8	61.4	72.0	83.3	94.9	106.6	118.5	130.4
1899 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 217.1	216.4	215.7	214.9	214.1	213.3	212.6	212.1	211.5	211.0	210.9	210.8	210.8	210.8	211.2	211.7	212.2	213.0
Jupiter	.. 323.8	331.6	339.4	347.0	354.5	2.1	9.6	16.9	24.1	31.2	38.1	44.9	51.7	58.2	64.4	70.5	76.5	82.0
Venus	.. 16.7	24.1	21.7	14.7	15.5	25.8	40.9	58.7	77.3	95.7	113.6	129.8	142.3	147.0	142.3	135.8	138.6	139.0
Saturn	.. 160.1	159.0	158.2	157.3	156.9	156.9	157.7	157.7	158.1	159.6	160.9	162.5	164.3	166.1	168.1	170.2	172.3	174.4
1900 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31	Je 11	Je 21	Je 31
Mercury	.. 13.8	26.1	38.4	50.2	62.7	74.7	86.8	98.7	110.5	122.3	134.0	145.6	157.0	168.3	179.3	190.0	200.3	209.7
Jupiter	.. 228.7	228.1	227.5	226.9	226.1	225.3	224.6	223.9	223.2	222.6	222.3	222.0	221.8	222.0	222.3	222.6	223.3	224.0
Venus	.. 96.9	100.4	104.7	109.5	114.5	119.6	125.2	130.6	136.6	142.4	148.3	154.6	160.8	167.1	173.5	180.0	186.9	193.5
Saturn	.. 4.1	35.6	35.6	4.0	18.6	35.8	54.2	73.3	91.6	108.6	121.8	129.2	126.5	119.2	119.9	129.0	143.6	160.3
1901 Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 1	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31
Mercury	.. 194.2	191.9	191.7	190.3	189.1	188.1	187.4	187.0	187.0	187.2	188.6	189.0	189.0	189.0	192.4	194.2	196.1	198.1
Jupiter	.. 320.3	332.4	344.2	356.2	8.1	20.2	32.2	44.4	56.0	68.6	80.9	92.8	105.2	117.3	129.8	142.0	154.0	166.8
Venus	.. 240.1	239.7	239.3	238.7	238.0	237.3	236.5	235.8	235.1	234.3	233.8	233.4	233.0	233.0	233.1	233.1	233.7	234.3
Saturn	.. 340.6	348.5	356.0	3.7	11.3	18.6	25.9	33.2	40.5	47.5	54.2	61.1	67.7	74.4	80.8	87.0	93.3	99.3
1902 Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 1	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31
Mercury	.. 336.2	342.6	356.1	13.0	31.6	50.7	69.4	86.8	101.2	110.3	110.3	102.9	100.9	108.7	122.6	138.9	156.6	174.3
Jupiter	.. 227.9	227.2	226.2	225.1	223.8	222.4	221.1	219.9	219.0	218.2	217.7	217.6	217.9	218.4	219.3	220.4	221.8	232.3
Venus	.. 44.7	55.1	65.1	74.3	82.5	88.5	92.2	92.5	88.6	82.3	76.7	74.9	77.0	82.0	89.4	97.7	107.5	117.5
Saturn	.. 251.1	250.8	250.6	250.3	249.7	249.1	248.4	247.7	246.9	246.2	245.5	244.9	245.2	244.1	244.0	243.9	244.3	244.8
1903 Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 1	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31	Je 12	Je 22	Je 31
Mercury	.. 121.6	122.9	125.3	128.4	132.1	136.3	141.1	146.1	151.5	157.1	163.0	168.8	175.1	181.2	187.8	194.3	201.1	208.0
Jupiter	.. 334.6	350.5	8.6	27.4	48.1	64.3	78.8	90.6	92.5	85.8	82.1	88.6	101.2	117.5	135.0	153.1	170.8	186.7
Venus	.. 260.0	260.3	260.0	260.1	259.5	258.6	257.4	256.2	254.9	253.5	252.3	251.0	250.4	249.8	249.3	249.0	250.3	251.1
Saturn	.. 355.2	7.6	20.0	32.3	44.2	56.9	69.2	81.3	93.5	105.7	118.1	130.0	142.3	154.3	166.3	178.2	190.3	202.2
190																		

completed day of the Indian Solar year from A.D. 1839—A.D. 1999;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
0 9	0 19	0 29	N 8	N 18	N 28	D 8	D 18	D 28	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
119 9	156-2	162-3	168-9	174-9	181-3	187-5	193-7	199-9	206-1	212-4	218-7	224-8	230-9	237-0	243-2	248-9	254-8	260-5
159 8	175-2	192-2	209 7	226-6	242-0	254-2	259-3	255-1	248-5	249-9	259 7	274-2	291-2	309-1	327-4	344-6	359-9	10-8
315-2	311-5	314-3	314-1	314-5	315-2	316-9	317-4	318-9	320-7	322-6	324-7	326-9	329-1	331-4	333-9	336-3	338-7	344-1
178-7	191-2	203-6	216-2	228 7	241-3	253-8	266 5	279-0	291-5	303 9	316-2	328-3	340-7	352-7	4-3	16-2	27-9	38-8
152-8	153-9	155 8	156-1	156-9	157-7	158-5	158-8	159-2	159-5	159-3	159-1	158-9	158-2	157-6	156-9	156-1	155-3	154-4
0 8	0 18	0 28	N 7	N 17	N 27	D 7	D 17	D 27	Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
293 0	297-4	302-3	307-5	313-1	319-1	325-3	331-6	337-9	344-3	350-9	357-5	4-0	10-6	17-2	23-7	30-5	36-8	43-3
171-2	188 7	206-4	223-3	235-6	242-9	241-8	234-2	232-3	240-0	253-8	270-1	287 7	305-6	323-1	338-7	350-6	354 7	349-8
356-1	354-7	353-4	352-2	351-3	350-8	350-6	350-7	351-2	352-0	353-1	354-4	356-1	357 9	359-9	2-0	4-3	6-5	8-9
128-5	139-0	150-9	162-7	174-0	186-6	198-8	211-2	223-2	235-8	248-3	260-7	275-3	285-8	298-5	310-6	325-2	339-6	347-2
163-6	164-7	165-9	167-0	168-0	169-0	170-0	170-5	171-0	171-5	171-5	171-6	171-6	171-1	170-6	170-1	169-3	168-6	167-8
162 1	168-6	175-1	181-4	188-1	194-6	201-2	207-7	214-4	221-0	227-8	234-6	241-4	248-2	255-1	262-0	269-0	275-9	283-0
185-8	202-4	216-5	226-1	227-4	220-5	216-3	221-7	223 7	249-3	266-5	284-7	301-7	317-7	330-3	336-4	333-3	326-5	327-5
36-6	35-7	34-5	33-2	31-8	30-5	29-2	28-2	27-4	26-9	26-8	27-1	27-6	28-5	29-7	31-1	32-8	34-5	36-6
213-4	225-5	237-0	248-4	259 7	270-5	280-7	290-5	299-1	306-0	311-4	313-0	311-1	304-7	299-7	299-6	298-2	303-2	309-3
171-2	175-4	176-6	177-9	178-9	170-9	181-0	181-7	182-4	183-2	183-4	183-6	183-7	183-4	183-1	182-8	182-1	181-4	180-8
0 9	0 19	0 29	N 8	N 18	N 28	D 8	D 18	D 28	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
3-5	0-8	358-4	357-5	357-4	358-5	0-3	3-2	6-6	10-5	14-7	19-7	24-9	30-1	35-1	41-1	46-9	52-7	58-5
197-1	208-6	212-3	207-5	201-1	203-3	214-1	228-8	245-6	263-3	280-5	296-9	310-3	318-3	316-9	307-6	308-4	317-5	331-4
72-3	72-4	72-4	71-9	71-2	70-1	68-8	67-4	66-2	64-9	64-7	62-7	62-1	61-8	61-8	62-2	62-8	63-8	65-0
159-9	172-4	184-8	197-3	209-9	222-3	235-1	247-7	260-3	272-9	285-5	290-4	310-8	323-3	336-0	348-4	0-8	13-0	24-6
184-6	185-8	187-0	188-2	189-3	190-4	191-5	192-3	193-1	194-0	194-5	195-0	195-4	195-2	195-1	195-0	194-4	193-8	193-3
0 9	0 19	0 29	N 8	N 18	N 28	D 8	D 18	D 28	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 7	Mr 17	Mr 27	Ap 6
61-1	63-8	65-4	66-0	65-2	62-9	60-2	56-9	53-9	235-7	242-9	250-0	257-4	264-7	271-9	279-6	286-9	294-5	302-0
196-2	193-6	186-1	186-3	195-1	208-9	225-2	242-4	260-0	276-4	290-6	299 9	300-9	290-8	209-5	296-9	309-0	326-5	344-7
102-4	103-6	104-5	105-2	105-5	105-6	105-3	104-6	103-7	102-5	101-2	99-9	98-5	97-4	96-3	95-4	95-1	94-8	95-1
145-0	146-7	151-5	158-4	166-6	176-5	186-6	197-8	209-1	220-4	232-5	244-3	256-4	268-6	280-9	293-1	305-3	317-6	330-1
194-8	196-0	197-2	198-3	199-5	200-5	201-8	202-6	203-7	204-6	205-2	205-8	206-4	206-5	206-7	206-8	206-3	205-9	205-4
0 8	0 18	0 28	N 7	N 17	N 27	D 7	D 17	D 27	Ja 6	Ja 16	Ja 26	F 5	F 15	F 25	Mr 7	Mr 17	Mr 27	Ap 6
171-8	168-8	175-9	189-0	204-9	225-9	239-2	256-1	270-9	281-5	287-9	279-0	273-5	277-6	289-3	304-8	322-7	341-0	359-3
129-0	130-7	132-4	133-8	135-1	136-0	136-7	137-1	137-1	136-9	136-3	135-3	134-2	132-9	131-6	130-2	129-0	127-9	127-1
197-4	209-8	222-2	234-5	246-6	259-0	271-2	283-2	295 7	307-6	318-6	330-0	340-8	351-2	1-1	10-0	17-5	23-1	25-8
204-7	205-9	207-1	208-2	209-4	210-6	211-7	212-8	213-9	214-9	215-6	216-3	217-1	217-4	217-6	218-0	217-9	217-6	217-4
186-9	193-7	200-6	207-4	214-4	221-6	228 7	236-0	243-2	250-7	257 9	265-6	273-2	280-8	288-5	296-3	304-1	311-9	319-7
157-5	169-2	184-6	205-5	218-8	235-9	251-1	263-3	269-7	264-9	257-8	259-2	269-7	283-7	300-8	318-9	337-3	354-8	10-3
153-2	153-3	157-4	159-4	161-1	162-8	164-2	165-4	166-4	167-0	167-4	167-5	167-3	166-6	165-7	164-7	163-4	162-1	160-8
142-4	154-6	166-7	179-2	191-6	204-0	216-6	227-0	241-7	254-4	267-0	279-6	292-1	304-7	317-3	329-9	342-3	354-7	7-2
214 8	215-9	217-0	218-1	219-4	220-7	221-9	223-0	224-1	225-1	226-0	226-8	227-7	228-1	228-5	228-8	228-8	228-7	228-7
0 9	0 19	0 29	N 8	N 18	N 28	D 8	D 18	D 28	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
87-2	92-0	96-6	100-3	103-6	106-0	107-5	107-8	106-9	104-3	100-9	97-2	93-6	90-7	89-3	89-0	90-0	92-1	94-9
164-1	180-7	198-1	215-4	231-3	244-5	252-1	260-9	242-3	241-5	249-7	263-0	279-3	297-0	315-2	332-8	348-8	1-0	5-6
176-6	178 9	181-0	183-2	185-3	187-4	189 3	191-0	192-7	194-2	195-3	196-4	197-0	197-5	197-6	197-3	196 8	195-8	194-7
218-5	225-9	231-3	233-7	232-8	227-3	221-6	218-5	219-0	223-3	230-0	238-4	247-7	257-7	268-3	279-5	290-8	302-4	314-0
224-7	225-7	226-7	227-8	229-0	230-2	231-3	232-4	233-6	234-7	235-7	236-7	237-7	238-3	238-9	239-6	239-7	239-9	240-0
200-4	207-3	214-2	221-5	228-6	235-9	243-8	250-7	258-3	265-9	273-7	281-4	289-1	297-0	304-8	312-8	320-9	328-5	336-5
177-5	195-0	211-6	225-6	235-2	236-3	229-3	225-1	230-4	243-0	258-8	276-1	293-9	311-3	327-4	340-4	347-0	343-7	336-7
200-2	202-4	204-5	206-7	208-9	211-2	213-3	215-5	217-6	219-5	221-3	223-1	224-6	226-0	226-9	227-7	228-1	228-3	228-2
178-8	191-8	204-2	216-8	229-3	241-9	254-6	267-0	279-7	292-1	304-5	316-6	328-9	341-1	353-1	4-7	16-6	28-1	39-2
234-9	235-8	236-7	237-6	238-9	239-8	241-0	242-2	243-4	244-5	245-6	246-6	247-7	248-5	249-3	250-1	250-4	250-5	251-2
105-1	110-6	115-8	120-8	125-6	129-9	133-6	136-7	139-1	140-5	141-1	139-7	137-3	134-0	130-4	126-6	123-5	121-5	121-3
191-4	206-4	217-6	221-4	216-1	210-0	212-5	223-3	238-3	255-0	272-7	290-0	306-5	320-2	328-1	327-7	319-8	318-8	327-2
225-1	227-0	229-0	231-1	223-4	235-5	237-9	240-1	242-4	244-5	246-8	248-9	250-9	252-9	254-7	256-3	257-7	258-8	259-6
128-4	139-9	151-3	163-1	174-1	187-1	199-3	211-5	223-7	235-9	248-8	261-1	273-7	286-2	298-8	311-2	323-6	336-2	348-6
245-1	246-0	246-8	247-5	248-7	249-7	250-8	252-0	253-2	254-3	255-4	256-5	257-7	258-6	259-5	260-4	260-9	261-4	262-0
214-8	221-9	228-9	236-3	243-7	251-1	258-8	266-4	274-0	281-9	289-6	297-3	305-5	313-3	321-2	329-1	337-0	344-6	352-3
199-3	205-5	202-6	195-2	195-1	204-3	215-0	234-2	251-7	269-3	285-9	300-3	309-7	310-6	304-0	300-2	307-1	320-0	336-5
252-2	253-5	255-2	256-9	258-9	260-9	263-0	265-3	267-5	269-9	272-1	274-4	276-8	279-1	281-4	283-5	285-5	287-4	289-2
214-0	226-0	237-4	248-8	259-9	270-7	280-0	290-3	298-6	305-0	309-7	310-8	307-9	301-0	296-0	295-5	297-0	301-5	308-6
255-5	256-2	256-9	257-6	258-6	259-7	260-7	261-8	263-0	264-1	265-3	266-5	267-7	268-7	269-6	270-7	271-3	272-1	272-7
0 10	0 20	0 30	N 9	N 19	N 29	D 9	D 19	D 29	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
110-6	125-5	131-2	136-9	142-3	147-5	152-5	157-2	161-4	165-4	168-7	171-1	172-9	173-7	172-7	170-4	167-1	163-3	159-5
188-4	181-0	178-4	186-1	197-6	213-8	230-4	248-4	265-2	280-4	291-4	294-4	288-5	287-2	287-6	298-7	314-7	332-2	350-9
283-0	284-0	284-7	285-6	287-0	288-4	290-2	2											

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of L.S.Y.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
Eng.	Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Ji 2	Ji 12	Ji 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1903 Mars	158.6	157.6	156.6	155.4	154.2	158.7	161.9	165.8	170.1	175.0	180.3	185.7	191.6	197.9	204.4	210.5	217.3	224.2
Mercury	6.9	19.2	37.6	48.7	54.7	51.1	44.6	47.1	58.2	73.6	91.2	109.8	128.0	145.2	160.6	170.9	173.2	166.7
Jupiter	318.5	320.5	322.5	324.1	325.9	327.3	328.4	329.2	329.6	329.8	329.6	328.2	325.1	320.6	315.8	312.5	310.3	308.7
Venus	31.8	44.0	57.7	67.4	79.1	90.5	101.3	112.1	122.3	132.1	141.3	149.3	155.5	158.7	159.4	157.6	149.0	144.8
Saturn	283.8	284.1	284.7	284.8	284.7	284.4	284.2	283.6	283.0	282.4	281.6	280.8	280.1	279.4	278.8	278.1	277.9	277.8
Eng.	Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Ji 1	Ji 11	Ji 21	Ji 31	Au 10	Au 20	Au 30	S 9	S 19	S 29
1904 Mars	11.7	19.6	26.3	33.6	40.7	47.8	54.8	61.5	68.4	75.1	81.7	88.5	94.9	101.5	107.8	113.1	120.5	126.7
Mercury	13.5	27.4	34.8	34.2	25.9	26.4	36.1	51.3	68.9	87.6	105.9	124.0	140.0	152.0	156.6	152.2	145.7	147.1
Jupiter	346.4	348.8	351.1	353.1	355.5	357.7	359.7	361.4	362.9	364.2	365.2	366.0	366.6	367.0	367.3	367.5	367.6	367.7
Venus	337.0	340.3	344.1	348.8	354.0	359.5	365.0	370.0	374.0	377.0	379.5	381.5	383.0	384.0	384.5	384.6	384.6	384.6
Saturn	294.6	295.2	295.9	296.4	296.8	297.1	297.3	297.5	297.6	297.7	297.8	297.9	298.0	298.1	298.2	298.3	298.4	298.5
Eng.	Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Ji 2	Ji 12	Ji 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1905 Mars	211.3	209.5	206.9	202.6	200.4	198.2	197.2	197.8	199.1	202.0	205.2	209.3	214.1	219.2	225.0	230.8	237.2	243.8
Mercury	14.6	15.1	7.9	0.1	14.8	28.9	46.1	64.7	83.6	101.9	118.6	132.1	139.1	136.7	130.6	129.8	130.1	152.8
Jupiter	15.7	16.0	18.1	20.8	23.3	25.7	28.0	30.2	32.4	34.2	36.3	37.9	39.4	40.5	41.4	42.2	42.5	42.3
Venus	22.5	18.3	11.8	7.2	6.1	9.2	15.0	22.1	31.3	40.8	50.9	61.6	72.5	84.2	96.1	107.3	118.9	131.3
Saturn	305.6	305.3	305.0	304.8	304.6	304.3	304.0	303.8	303.5	303.2	302.9	302.6	302.3	302.0	301.7	301.4	301.1	300.8
Eng.	Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Ji 2	Ji 12	Ji 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1906 Mars	28.6	33.5	40.1	47.5	54.2	61.0	67.8	74.5	81.0	87.7	94.4	100.7	107.2	113.7	120.0	126.5	132.7	139.9
Mercury	330.5	334.9	339.3	343.7	348.1	352.5	356.9	361.3	365.7	370.1	374.5	378.9	383.3	387.7	392.1	396.5	400.9	405.3
Jupiter	41.6	43.8	45.9	48.2	50.7	52.9	55.2	57.5	59.9	62.2	64.5	66.8	69.1	71.4	73.7	75.9	78.2	80.5
Venus	14.4	26.7	39.0	51.3	63.4	75.4	87.4	99.2	111.0	122.8	134.5	146.2	157.7	168.6	179.6	190.2	200.3	209.5
Saturn	316.6	317.5	318.4	319.3	319.8	320.3	320.8	321.3	321.8	322.3	322.8	323.3	323.8	324.3	324.8	325.3	325.8	326.3
Eng.	Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Ji 1	Ji 11	Ji 21	Ji 31	Au 10	Au 20	Au 30	S 9	S 19	S 29
1907 Mars	252.2	256.3	260.2	263.3	265.5	266.8	267.1	268.0	268.4	268.5	268.6	268.7	268.8	268.9	269.0	269.1	269.2	269.3
Mercury	332.7	344.8	356.9	369.0	381.1	393.2	405.3	417.4	429.5	441.6	453.7	465.8	477.9	489.9	502.0	514.1	526.2	538.3
Jupiter	69.7	71.2	72.8	74.7	76.7	78.8	81.0	83.2	85.6	87.9	90.1	92.5	94.7	97.0	99.0	101.0	102.8	104.6
Venus	320.6	332.6	344.7	356.7	368.7	380.7	392.7	404.7	416.7	428.7	440.7	452.7	464.7	476.7	488.7	500.7	512.7	524.7
Saturn	327.7	328.8	329.9	330.9	331.6	332.2	332.8	333.3	333.8	334.3	334.8	335.3	335.8	336.3	336.8	337.3	337.8	338.3
Eng.	Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Ji 1	Ji 11	Ji 21	Ji 31	Au 10	Au 20	Au 30	S 9	S 19	S 29
1908 Mars	41.1	47.7	54.3	60.9	67.6	74.1	80.6	87.1	93.5	99.9	106.3	112.7	119.2	125.6	131.9	138.3	144.7	151.0
Mercury	338.5	356.2	373.9	391.6	409.3	427.0	444.7	462.4	480.1	497.8	515.5	533.2	550.9	568.6	586.3	604.0	621.7	639.4
Jupiter	99.5	100.1	101.0	102.0	103.4	104.9	106.8	108.8	110.7	112.8	115.0	117.2	119.4	121.6	123.8	126.1	128.3	130.5
Venus	45.0	53.6	64.9	74.0	81.3	87.7	89.4	89.8	85.1	78.7	73.7	69.2	65.1	61.4	58.1	54.8	51.5	48.2
Saturn	335.9	340.1	344.3	348.5	352.7	356.9	361.1	365.3	369.5	373.7	377.9	382.1	386.3	390.5	394.7	398.9	403.1	407.3
Eng.	Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Ji 2	Ji 12	Ji 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1909 Mars	278.2	284.9	291.2	297.6	303.9	309.8	315.5	320.6	326.2	330.7	334.7	337.5	339.3	339.7	338.9	336.7	334.1	332.0
Mercury	332.2	344.8	357.4	370.0	382.6	395.2	407.8	420.4	433.0	445.6	458.2	470.8	483.4	496.0	508.6	521.2	533.8	546.4
Jupiter	131.4	130.9	130.9	131.3	132.1	133.2	134.5	136.0	137.6	139.4	141.4	143.4	145.4	147.4	149.4	151.4	153.4	155.4
Venus	353.7	358.8	363.9	369.0	374.1	379.2	384.3	389.4	394.5	399.6	404.7	409.8	414.9	420.0	425.1	430.2	435.3	440.4
Saturn	350.6	351.9	353.2	354.4	355.5	356.6	357.6	358.3	359.0	359.7	360.4	361.1	361.8	362.5	363.2	363.9	364.6	365.3
Eng.	Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Ji 2	Ji 12	Ji 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1910 Mars	36.0	42.0	48.4	54.4	60.0	65.0	69.3	73.0	76.0	78.0	79.0	79.0	78.0	76.0	73.0	69.0	64.0	58.0
Mercury	6.9	24.0	38.1	46.0	44.3	37.0	37.0	46.9	61.7	79.1	97.6	115.9	133.9	149.7	171.6	173.7	175.7	177.9
Jupiter	164.8	163.7	162.5	161.1	161.1	161.1	161.3	162.3	163.4	164.6	166.1	167.7	169.7	171.6	173.7	175.7	177.9	180.0
Venus	313.6	322.9	333.1	343.8	354.5	365.2	375.9	386.6	397.3	408.0	418.7	429.4	440.1	450.8	461.5	472.2	482.9	493.6
Saturn	2.4	3.7	5.0	6.3	7.5	8.7	9.9	10.8	11.7	12.6	13.0	13.4	13.8	14.2	14.6	15.0	15.4	15.8
Eng.	Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Ji 1	Ji 11	Ji 21	Ji 31	Au 10	Au 20	Au 30	S 9	S 19	S 29
1911 Mars	298.5	306.0	313.4	320.6	328.2	335.3	342.7	349.6	356.5	363.4	370.3	377.2	384.1	391.0	397.9	404.8	411.7	418.6
Mercury	16.5	26.0	26.1	19.2	17.0	25.1	39.5	56.6	75.0	93.7	111.9	128.5	142.2	148.9	147.0	139.4	135.8	147.9
Jupiter	198.8	197.6	197.0	194.9	193.8	192.8	191.9	191.4	191.4	191.4	191.7	192.6	193.5	194.9	196.3	197.7	199.1	200.5
Venus	32.4	44.4	56.3	67.8	79.5	90.9	101.6	112.3	123.0	133.7	144.4	155.1	165.8	176.5	187.2	197.9	208.6	219.3
Saturn	14.4	14.9	17.0	18.4	18.8	21.0	22.3	23.4	24.5	25.6	26.7	27.0	27.6	27.8	27.9	28.0	27.6	27.2
Eng.	Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Ji 1	Ji 11	Ji 21	Ji 31	Au 10	Au 20	Au 30	S 9	S 19	S 29
1912 Mars	71.2	76.9	82.5	88.3	94.1	100.0	106.0	112.0	118.2	124.2	130.4	136.8	143.0	149.4	155.7	162.2	168.8	175.3
Mercury	8.0	17.7	35.7	5.0	16.9	33.8	52.1	71.1	89.9	107.1	121.6	130.9	139.7	125.7	121.3	128.0	141.8	158.0
Jupiter	232.4	231.0	230.6	229.9	228.6	227.3	225.9	224.8	223.7	222.9	222.2	222.0	222.0	222.4	223.3	224.4	225.4	226.8
Venus	337.5	349.8	362.1	374.3	386.5	398.7	410.9	423.1	435.3	447.5	459.7	471.9	484.1	496.3	508.5	520.7	532.9	545.1
Saturn	26.8	28.1	29.4	30.6	32.0	33.4	34.8	36.0	37.2	38.5	39.4	40.2	41.1	41.5	41.9	42.4	42.2	42.1
Eng.	Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Ji 2	Ji 12	Ji 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1913 Mars	317.0	324.6	332.5	339.8	347.7	355.1	362.0	368.4	375.3	381.7	388.6	395.0	401.9	408.3	415.2	421.6	428.5	434.9
Mercury	339.0	343.2	355.3	367.4	379.5	391.6	403.7	415.8	427.9	439.9	451.9	463.9	475.9	487.9	499.9	511.9	523.9	535.9
Jupiter	264.0	264.6	264.8	264.7	264.4	263.6	262.6	261.4	260.1	258.8	257.5	256.3	255.5	254.7	254.4	254.4	254.6	255.3
Venus	19.5	14.2	8.3	4.2	4.1	8.1	14.3	22.1	31.0	41.0	51.4	61.9	73.0	84.3	96.0	107.8	119.7	131.6
Saturn	39.4	40.7	42.0	43.3	44.6	45.9	47.3	48.6	49.9	51.2								

P.G.—contd.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	240	250	260	270	280	290	300	310	330	340	350	360			
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 8	Mr 18	Mr 28	Ap 7
231-2	238-2	245-5	252-9	260-3	267-9	275-6	283-1	290-9	298-7	306-6	314-3	322-1	329-8	337-5	345-3	352-8	0-3	7-8
161-8	166-7	178-4	193-9	210-7	228-1	245-0	260-4	272-4	327-8	274-1	267-1	258-6	278-5	293-4	310-7	322-7	347-2	4-8
320-7	319-8	319-3	319-0	319-3	319-7	320-6	321-8	323-2	220-9	233-0	245-0	257-1	269-2	281-5	293-6	306-0	318-2	330-7
142-9	144-2	150-6	158-1	167-1	176-8	187-1	198-0	209-4	284-2	285-4	286-6	287-8	289-0	290-3	291-3	292-3	293-2	294-2
277-5	277-9	278-2	278-6	279-4	280-2	281-0	282-1	283-2	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	184-3	189-3	194-0	198-4	202-4	205-8	208-6	210-8	212-0	212-8
132-9	138-9	144-9	150-9	156-6	162-4	168-0	173-5	179-0	252-2	250-9	253-6	272-6	289-1	307-0	325-2	343-0	358-9	11-4
158-8	173-4	190-2	207-4	224-8	240-7	253-8	261-1	259-7	356-5	357-5	358-7	0-2	2-0	3-9	5-0	8-0	10-4	12-7
1-8	0-4	359-1	357-7	356-7	356-1	355-6	355-6	355-9	307-6	319-0	330-2	341-0	351-4	0-7	9-6	16-7	21-6	23-1
198-0	210-4	222-6	234-9	247-2	259-4	271-6	283-8	295-9	294-5	295-7	296-9	298-0	299-2	300-4	301-7	302-8	303-9	305-0
289-2	289-4	289-5	289-5	290-2	290-9	291-5	292-5	293-5	316-6	324-0	331-7	339-0	346-5	354-0	1-1	8-6	15-7	22-8
250-5	257-5	264-6	271-8	279-4	286-4	294-0	301-5	309-1	240-0	252-3	267-9	283-4	303-3	321-2	337-3	350-6	357-0	354-8
169-2	185-5	204-3	220-8	234-8	244-3	245-2	238-1	234-2	32-1	31-8	31-9	32-2	33-0	34-0	35-2	36-7	38-4	40-3
41-9	41-1	40-1	38-9	37-5	35-9	34-9	32-5	32-9	254-8	267-5	280-0	292-8	305-2	317-8	330-3	342-9	355-4	7-6
143-3	155-1	167-3	179-7	192-0	204-5	217-5	230-6	242-1	305-2	306-3	307-4	308-6	309-9	311-2	312-4	313-7	314-9	316-0
301-7	301-6	301-4	301-2	301-7	302-1	302-6	303-5	304-4	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	200-5	206-2	213-8	217-9	223-7	229-3	234-8	240-0	245-0	249-9
145-2	151-5	157-7	163-8	170-8	176-1	182-2	188-3	194-3	247-3	264-6	282-1	299-7	316-2	330-1	338-5	337-6	330-1	329-2
183-9	200-5	215-6	226-7	230-2	224-6	218-6	221-9	232-5	70-4	69-1	68-1	67-2	66-8	66-8	66-9	67-3	68-1	68-9
76-7	77-0	77-1	76-8	76-2	75-3	74-2	72-7	71-5	221-8	229-2	237-9	247-4	257-7	268-6	279-7	291-0	302-7	314-4
218-0	224-8	229-3	230-8	228-3	222-7	217-3	215-1	217-1	316-3	317-4	318-5	319-5	320-7	321-9	323-2	324-5	325-8	327-1
314-3	314-1	313-9	313-4	313-6	313-8	314-1	314-9	315-6	335-9	342-9	347-9	356-8	3-7	10-6	17-2	24-1	30-8	37-6
277-3	283-1	289-1	295-6	302-1	308-8	315-4	322-0	329-1	261-0	278-8	295-4	309-7	319-6	320-8	314-1	310-5	316-8	330-1
195-8	208-5	214-5	211-6	204-2	204-3	213-1	227-2	243-5	107-4	106-3	105-1	103-6	102-5	101-4	100-4	99-8	98-5	99-6
109-1	107-6	108-6	109-3	109-8	109-9	109-5	109-1	108-4	292-4	305-0	317-1	329-4	341-6	353-6	5-2	16-9	28-4	39-3
179-8	192-3	204-7	217-3	229-8	242-6	255-1	267-4	280-0	327-9	328-9	329-9	330-8	332-1	333-2	334-4	335-7	337-0	338-3
327-8	327-3	326-8	326-1	326-3	326-2	326-2	326-7	327-2	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	215-3	221-9	228-4	235-0	241-6	248-2	255-0	261-5	268-1	274-8
187-4	163-8	170-1	176-6	183-0	189-5	195-8	202-3	208-9	274-8	289-8	300-6	304-1	298-0	292-8	297-3	308-6	324-9	342-4
198-0	197-4	189-9	187-4	194-7	207-3	223-2	240-5	258-0	141-1	140-7	139-9	138-7	137-6	136-4	135-1	133-8	132-7	131-3
132-3	134-0	135-7	137-3	138-7	139-8	140-6	141-1	141-2	236-8	249-5	261-8	274-5	286-8	299-5	311-9	324-3	336-9	349-1
129-0	140-3	151-9	163-6	175-3	187-6	199-9	212-2	224-4	340-0	340-8	341-7	342-5	343-6	344-7	345-9	347-2	348-5	349-8
341-9	341-2	340-5	339-8	339-5	339-2	339-1	339-4	339-7	359-1	4-7	10-4	16-1	22-1	28-0	34-6	40-1	46-3	52-4
330-3	330-3	332-2	333-3	336-3	340-0	344-2	348-9	353-9	282-1	287-3	283-3	276-7	278-3	288-1	303-0	320-4	338-7	357-2
175-9	171-2	176-2	187-7	202-9	219-9	237-2	254-4	269-8	170-9	171-4	171-5	171-4	170-9	170-2	169-1	168-0	166-7	165-5
156-4	158-6	160-6	162-6	164-5	166-1	167-6	168-9	169-9	304-0	307-2	307-2	303-3	297-0	292-4	291-8	294-8	300-7	308-2
214-5	226-4	237-6	249-1	260-0	270-7	280-4	289-8	297-7	352-9	353-5	354-1	354-8	355-8	356-8	357-9	359-1	0-3	1-6
256-6	255-7	256-8	254-8	253-6	253-1	252-3	252-7	252-8	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	229-9	237-0	243-9	251-1	258-2	265-5	272-7	280-0	287-3	294-6
169-4	176-0	182-6	189-3	195-9	202-6	209-2	216-1	223-0	268-8	261-3	260-2	268-3	282-0	298-8	316-8	335-1	353-0	8-9
157-6	168-1	182-8	199-4	216-8	234-0	250-0	262-9	270-7	197-9	199-4	200-3	201-2	201-6	20-7	201-6	201-3	200-5	196-5
190-1	182-3	184-4	186-6	188-8	190-9	192-8	194-6	196-3	274-3	286-8	299-5	312-0	324-6	337-1	349-4	1-9	14-1	25-9
161-2	173-7	186-2	199-2	211-2	223-9	236-3	249-2	261-7	6-3	6-7	7-1	7-5	8-4	9-3	10-1	11-3	12-5	13-7
11-5	19-7	9-9	9-0	8-3	7-6	6-9	6-8	6-6	32-9	34-7	37-1	40-4	44-1	48-4	53-0	57-9	63-1	68-4
44-8	45-2	44-6	43-0	40-0	37-0	34-5	32-8	32-3	243-5	248-9	261-3	277-5	295-2	313-3	331-2	347-6	0-9	8-2
132-5	178-7	196-3	213-4	229-9	244-1	255-4	254-2	247-2	222-2	225-0	226-7	213-3	229-8	230-9	231-8	232-4	232-7	232-7
203-8	205-8	207-9	210-2	212-4	214-6	216-8	218-0	221-1	221-3	233-7	245-4	257-6	269-7	282-1	294-1	306-4	318-8	331-3
140-5	143-0	150-0	157-7	166-8	176-8	187-1	198-2	209-7	20-5	20-6	20-7	20-8	21-5	22-2	22-9	24-0	25-1	26-1
26-7	25-9	27-7	24-4	23-6	22-8	21-9	21-4	20-9	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	244-7	254-1	259-5	266-9	274-6	282-0	289-9	297-5	305-2	312-9
181-9	188-6	195-3	202-3	209-1	216-1	223-1	230-2	237-4	241-6	256-8	273-8	291-6	309-4	326-4	340-0	348-6	348-4	341-0
175-4	190-0	209-9	224-6	235-8	238-8	234-0	227-8	231-0	247-9	250-1	253-3	254-3	256-3	258-2	259-9	261-5	262-8	263-6
228-6	230-4	232-4	234-5	236-7	238-9	241-1	243-3	245-7	307-9	320-1	330-5	341-2	351-3	0-9	9-4	15-6	18-3	21-3
198-5	210-8	223-8	235-4	247-7	260-1	272-1	284-2	296-1	35-3	35-1	34-9	34-8	35-2	35-6	35-9	36-9	37-8	38-8
41-9	41-3	40-6	39-9	39-0	38-2	37-3	36-7	36-1	85-4	81-1	78-4	76-0	75-1	75-5	77-3	79-6	82-8	86-6
78-5	82-9	86-6	89-8	91-8	92-9	92-9	91-3	88-7	252-9	270-5	288-3	305-1	319-9	329-7	331-1	324-1	320-7	327-3
189-7	205-2	218-1	225-0	220-1	211-6	213-5	222-5	236-6	273-3	275-6	278-0	283-9	282-7	284-9	287-1	289-3	291-2	293-2
256-2	257-6	259-2	260-8	262-5	264-5	266-6	268-9	271-0	255-3	268-2	280-7	293-5	306-0	319-0	331-0	343-7	356-5	8-6
143-6	155-8	168-2	180-7	193-0	205-3	217-9	230-3	242-6	50-6	50-2	49-8	49-3	49-4	49-6	49-7	50-4	51-1	51-8
56-7	56-9	55-9	55-4	54-6	53-8	52-9	52-2	51-4	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	260-0	267-6	275-2	282-9	290-7	298-8	306-2	314-2	322-2	329-9
195-2	202-1	209-1	215-9	222-9	230-0	237-3	244-7	252-1	267-2	284-2	299-2	310-5	313-9	308-1	302-6	307-3	318-8	334-7
198-8	207-0	206-4	198-9	196-6	203-8	214-6	232-5	249-7	288-5	288-8	289-3	290-1	291-3	292-6	293-9	295-2	296-5	298-2
238-5	258-8	289-3	290-1															

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of L.S.Y.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170			
1915 Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
Mercury	.. 334-0	341-9	349-6	357-3	4-8	12-4	19-7	27-1	34-4	41-4	48-4	54-9	61-8	68-5	74-7	81-0	87-0	92-8			
Jupiter	.. 344-2	2-5	21-5	40-0	56-9	70-2	76-7	73-7	66-8	68-4	78-8	94-1	111-4	129-6	147-6	164-7	179-4	189-6			
Venus	.. 322-2	324-4	326-4	328-4	330-0	331-6	332-8	333-7	334-4	334-8	334-9	333-4	333-7	331-5	330-2	328-8	327-4				
Saturn	.. 321-3	333-1	345-2	357-4	9-1	21-4	33-5	45-5	57-6	69-7	81-9	94-0	106-3	118-6	131-0	143-2	155-6	168-0			
1916 Mars	.. 65-5	66-5	67-5	68-5	69-8	71-1	72-3	73-7	75-0	76-3	77-6	78-9	80-2	81-3	82-4	83-5	84-1	84-8			
Mercury	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 9	S 19	S 29
Jupiter	.. 110-8	113-3	116-6	120-7	124-9	129-7	134-5	140-5	145-5	151-0	156-9	162-8	169-3	175-5	182-1	188-8	195-1	202-0			
Venus	.. 358-7	17-1	34-3	48-7	57-0	56-0	48-7	48-0	57-6	72-2	89-3	107-6	126-0	143-8	159-4	171-4	176-0	171-2			
Saturn	.. 319-9	332-3	334-7	337-1	339-3	1-4	3-5	5-3	7-0	8-0	9-6	10-5	11-1	11-3	11-1	10-6	10-0	8-9			
1917 Mars	.. 45-2	55-6	65-1	73-8	80-6	86-0	87-6	86-7	82-9	75-3	70-7	70-9	74-5	80-8	88-9	97-8	107-9	118-4			
Mercury	.. 79-1	79-9	80-7	81-5	82-6	83-7	84-9	86-2	87-5	88-9	90-2	91-5	92-9	94-1	95-3	96-1	97-1	98-2			
Jupiter	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
Venus	.. 350-4	358-1	5-4	13-1	20-5	28-1	35-0	42-3	49-3	56-6	63-2	69-8	76-6	83-0	89-6	95-8	101-9	108-1			
Saturn	.. 12-0	27-3	37-3	37-4	30-2	28-1	36-2	50-0	67-0	85-1	103-8	122-0	138-5	152-1	158-2	156-8	149-1	149-3			
1918 Mars	.. 17-7	20-1	22-5	24-9	27-3	29-7	32-0	34-4	36-5	38-6	40-5	42-2	43-8	45-0	46-1	46-8	47-2	47-3			
Mercury	.. 356-5	8-8	21-2	33-5	45-0	58-1	70-2	82-5	94-4	106-9	119-1	131-2	143-3	155-3	167-3	179-2	191-4	203-0			
Jupiter	.. 92-7	93-2	93-7	91-3	95-4	96-4	97-3	97-7	99-7	101-0	102-1	103-8	105-1	106-3	107-5	108-8	109-8	110-9			
Venus	.. 141-8	141-1	141-4	143-2	145-8	149-0	152-8	157-2	162-1	167-4	173-0	178-7	184-7	191-0	197-4	203-9	210-6	217-9			
Saturn	.. 16-0	19-0	12-5	8-3	11-6	27-6	45-1	62-6	81-6	101-0	117-3	131-6	140-8	141-0	133-7	131-1	138-6	151-6			
1919 Mars	.. 45-3	47-5	49-6	51-8	53-7	56-4	58-7	61-0	63-4	65-7	68-0	70-2	72-2	73-9	75-8	77-5	78-9	80-0			
Mercury	.. 313-4	323-1	333-2	344-0	354-9	6-3	17-6	29-3	41-1	53-0	65-0	76-5	88-7	100-7	112-9	125-1	137-3	149-6			
Jupiter	.. 106-5	106-7	106-9	107-3	108-1	108-9	109-6	110-7	111-8	113-7	114-3	115-6	116-8	118-1	119-4	120-8	121-9	123-0			
Venus	.. 6-0	13-3	20-5	27-0	35-0	42-2	49-4	56-4	63-8	69-8	76-8	83-6	89-7	96-3	103-1	109-4	115-6	121-4			
Saturn	.. 355-5	349-5	353-3	5-6	21-4	39-6	58-7	77-4	95-2	110-7	121-7	124-2	118-0	115-3	118-5	130-9	146-5	163-7			
1920 Mars	.. 73-9	75-2	76-9	78-6	80-5	82-5	84-6	86-8	89-1	91-4	93-6	95-9	98-3	100-5	102-6	104-7	106-7	108-4			
Mercury	.. 32-4	44-8	56-6	68-3	79-8	81-0	102-2	112-6	122-5	131-9	140-4	147-6	152-7	154-9	153-3	147-8	140-2	138-2			
Jupiter	.. 129-4	129-3	129-2	129-3	129-0	121-5	122-0	122-9	123-9	124-9	126-1	127-3	128-6	129-9	131-2	132-4	133-6	134-8			
Venus	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 9	S 19	S 29
Saturn	.. 189-6	186-4	182-7	180-5	179-0	179-0	180-1	182-3	185-6	189-5	194-0	198-7	204-5	210-3	215-9	222-3	228-8	235-3			
1921 Mars	.. 332-7	343-5	353-0	16-8	35-7	54-6	73-2	89-5	101-8	106-4	101-3	95-7	99-4	110-3	125-4	142-8	160-4	178-1			
Mercury	.. 103-8	104-2	104-9	105-9	107-1	108-5	110-3	112-1	114-0	116-2	118-3	120-4	122-6	124-9	127-0	129-2	131-6	133-5			
Jupiter	.. 338-2	350-5	2-9	15-1	27-4	39-6	52-0	64-2	76-4	88-9	101-9	113-2	125-4	137-8	150-0	162-4	174-7	187-1			
Venus	.. 134-2	133-9	133-6	134-1	133-8	134-1	134-4	135-2	136-0	136-7	137-9	139-0	140-2	141-4	142-6	143-9	145-2	146-5			
Saturn	Eng. A 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
1922 Mars	.. 20-8	28-0	35-1	42-2	49-1	56-0	62-8	69-5	76-4	82-9	89-5	96-0	102-5	109-0	115-4	121-7	128-0	134-1			
Mercury	.. 337-2	354-4	12-9	31-7	50-3	67-1	80-6	87-6	84-5	77-6	79-1	89-3	103-3	121-2	139-3	157-2	173-5	189-0			
Jupiter	.. 135-8	135-2	134-9	135-0	135-2	136-0	136-9	138-0	139-4	141-1	142-8	144-7	146-8	148-9	151-0	153-2	155-4	157-5			
Venus	.. 16-2	10-8	4-9	1-7	3-2	7-1	13-7	21-0	31-4	41-0	51-4	62-2	73-4	84-7	96-4	107-6	120-1	131-9			
Saturn	.. 147-9	147-4	146-9	146-5	146-5	146-6	146-6	147-2	147-8	148-4	149-4	150-3	151-3	152-5	153-7	154-9	156-2	157-0			
1923 Mars	.. 239-0	241-3	242-4	242-7	242-1	240-4	236-8	234-7	232-5	231-4	231-3	232-7	235-3	238-7	243-1	248-0	253-5	259-5			
Mercury	.. 350-2	9-0	27-4	44-8	59-2	67-8	67-1	59-7	59-1	69-6	82-3	99-3	117-4	135-8	153-0	168-8	180-7	185-1			
Jupiter	.. 169-4	168-1	167-0	166-2	165-4	165-1	165-1	165-3	166-1	166-9	168-0	169-4	171-1	172-8	174-7	176-7	178-8	180-2			
Venus	.. 15-7	27-9	40-2	52-2	64-4	76-3	88-4	100-3	112-1	123-8	135-3	146-8	158-0	169-2	179-9	190-2	200-0	209-9			
Saturn	.. 161-3	160-6	160-0	159-4	159-2	159-0	158-9	159-1	159-5	159-9	160-7	161-5	162-3	163-4	164-5	165-6	166-8	168-1			
1924 Mars	.. 35-5	42-2	49-0	55-7	62-4	69-1	75-7	82-2	88-6	95-3	101-8	108-0	114-6	120-9	127-2	133-6	140-0	146-4			
Mercury	.. 5-1	22-4	37-6	47-5	48-8	41-8	39-1	46-2	60-4	77-1	95-3	113-9	131-9	148-2	161-8	168-4	166-4	158-9			
Jupiter	.. 203-5	202-3	201-1	199-7	198-5	197-3	196-3	195-7	195-3	195-3	195-5	196-2	197-0	198-1	199-6	201-2	202-9	204-9			
Venus	.. 321-7	333-6	345-6	357-6	9-7	21-8	33-9	46-1	58-2	70-4	82-4	94-8	107-0	119-3	131-6	143-8	156-3	168-8			
Saturn	.. 174-4	173-7	173-0	172-2	171-8	171-4	171-0	171-1	171-3	171-3	171-9	172-5	173-2	174-2	175-2	176-2	177-4	178-6			
1925 Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 9	S 19	S 29
Mercury	.. 269-1	275-0	280-7	286-2	291-4	296-5	300-8	304-7	307-7	309-9	310-9	309-9	308-4	305-9	303-4	301-5	301-2	301-7			
Jupiter	.. 15-5	27-0	30-0	23-1	19-5	25-3	38-1	54-5	72-7	91-5	109-9	127-1	141-7	150-3	150-6	143-0	140-9	148-9			
Venus	.. 236-9	236-5	235-7	234-8	233-6	232-3	231-0	229-8	228-5	227-5	226-8	226-4	226-3	226-5	227-1	228-0	229-2	230-5			
Saturn	.. 45-1	55-5	64-9	73-1	80-1	84-4	85-7	86-7	77-6	71-3	68-6	68-9	73-4	80-4	88-6	97-9	108-2	118-9			
1926 Mars	.. 187-1	186-3	185-5	184-7	184-2	183-7	183-1	183-0	183-0	182-8	183-2	183-6	184-1	184-9	185-8	186-7	187-8	188-9			
Mercury	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 1	Je 11	Je 21	Je 1	Je 11	Je 21	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
Jupiter	.. 50-1	56-5	62-9	69-3	75-6	81-9	88-3	94-5	101-0	107-4	113-7	120-1	126-3	132-7	139-2	145-4	151-9	158-2			
Venus	.. 218-4	216-1	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6	216-6			
Saturn	.. 337-2	9-6	21-9	34-2	46-6	58-7	70-9	83-2	95-3	107-5	119-5	131-8	143-7	155-9	167-7	179-8	191-8	203-5			
1927 Mars	.. 199-5	198-7	197-9	197-2	196-5	195-8	195-2	194-9	194-7	194-7	19										

P.G.—contd.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310		330	340	350	360
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 8	Mr 18	Mr 28	Ap 7
98-4	104-1	108-9	113-5	117-8	121-7	125-0	127-0	127-9	1916	128-3	127-2	124-4	121-3	118-2	113-8	110-8	109-1	108-8	109-9
191-8	185-2	180-5	185-3	197-7	212-1	228-7	246-4	263-7		279-1	291-5	296-9	293-2	286-3	287-7	298-2	312-9	330-4	348-8
326-3	325-6	324-9	324-4	324-7	324-7	325-3	326-3	327-6		329-2	329-8	332-7	334-8	337-0	339-2	341-6	344-0	346-4	348-8
180-5	193-0	205-6	218-1	231-1	243-7	256-2	268-7	281-0		293-7	306-0	318-2	330-2	342-5	354-5	6-1	17-8	28-8	39-8
85-5	85-6	85-6	85-6	85-2	84-8	84-3	83-5	82-7		81-9	81-1	80-3	79-5	79-1	78-7	78-2	78-4	78-5	78-6
O 10	O 20	O 30	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
209-2	215-9	223-3	230-4	237-5	245-3	252-7	260-3	267-9	1917	275-7	283-6	291-2	299-1	306-9	314-8	322-6	330-7	338-5	346-3
164-7	167-2	177-2	191-9	208-6	225-9	243-1	259-1	272-3		279-8	278-4	271-2	269-5	278-1	291-7	308-5	326-8	344-3	3-3
7-8	6-4	5-0	3-8	2-6	1-7	1-0	0-9	0-9		1-4	2-1	3-2	4-4	6-1	7-9	9-7	11-9	13-1	16-4
129-5	140-8	152-5	164-2	176-3	188-3	200-5	212-7	225-0		237-5	250-2	262-5	275-2	288-0	300-0	312-6	325-1	337-6	350-9
99-1	99-4	99-7	100-1	99-9	99-6	99-5	98-8	98-1		97-4	96-5	95-6	94-8	94-2	93-6	92-9	92-8	92-7	92-6
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
113-9	120-1	125-2	130-9	136-1	140-9	145-8	149-9	153-7	1918	156-5	158-8	159-9	160-1	159-0	156-1	152-5	148-6	145-2	142-9
157-8	171-8	188-0	205-5	222-8	239-2	253-2	262-8	263-2		256-0	252-5	258-8	271-1	286-0	304-7	323-0	340-9	357-8	11-6
47-0	46-4	45-5	44-3	43-1	40-8	40-3	39-2	38-1		37-3	36-9	36-7	37-0	37-6	38-5	39-6	40-9	42-6	44-3
215-0	226-7	237-8	249-2	260-1	270-5	280-2	289-2	296-8		302-2	304-8	303-7	298-4	292-1	289-1	290-3	294-1	300-8	308-7
111-9	112-5	113-1	113-7	113-8	113-9	113-9	113-4	112-3		112-3	111-5	110-7	110-0	109-2	108-4	107-6	107-2	106-9	106-5
224-5	231-5	238-8	246-0	253-6	261-1	268-7	276-4	284-3	1919	292-0	299-8	307-7	315-5	323-2	331-1	338-9	346-6	354-2	1-7
167-7	184-6	202-3	219-0	234-1	244-0	248-2	242-5	236-6		240-2	251-2	267-2	283-3	301-4	319-4	336-1	350-3	359-3	359-0
80-9	81-1	81-8	81-6	81-2	80-3	79-0	78-1	76-8		75-6	74-3	73-2	72-2	71-6	71-3	71-3	71-5	72-3	73-3
161-9	174-4	186-8	199-7	211-9	224-6	237-0	249-8	262-4		275-1	287-6	300-0	312-7	325-3	337-8	350-1	2-4	14-7	26-6
124-2	125-0	125-8	126-7	127-0	127-2	127-6	127-4	127-2		126-9	126-2	125-5	124-7	124-0	123-3	122-5	121-9	121-3	120-7
127-9	133-9	139-6	145-4	151-1	156-8	162-1	167-4	172-7	1920	177-3	181-8	186-0	189-4	192-6	194-6	195-5	195-6	194-1	191-6
181-5	198-7	214-3	226-7	232-5	239-4	221-9	222-3	231-8		245-9	262-4	280-2	297-7	314-8	329-4	339-6	341-4	334-8	331-1
110-0	111-3	112-5	113-4	114-1	114-4	114-4	114-1	113-3		112-4	111-3	109-9	108-6	107-4	106-2	105-2	104-4	104-0	103-9
138-9	142-5	149-1	157-4	166-4	176-7	187-5	198-6	209-9		221-6	234-3	245-9	258-1	270-2	282-6	294-7	307-2	319-4	331-8
136-1	137-1	138-0	139-1	139-6	140-2	140-7	140-7	140-7		140-6	140-1	139-6	139-1	138-2	137-5	136-7	136-0	135-3	134-5
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
242-3	249-4	256-5	263-8	271-2	279-0	286-4	294-1	301-9	1921	309-5	317-3	325-0	332-3	340-1	347-6	355-0	2-5	9-4	16-8
194-5	208-1	216-3	215-2	207-9	204-9	212-9	225-8	241-7		258-9	278-5	293-6	301-1	320-4	324-1	318-5	313-1	316-7	328-7
135-5	137-6	139-4	140-9	142-3	143-6	144-5	145-1	145-5		145-5	145-1	144-5	143-6	142-5	141-2	140-0	138-6	137-3	136-3
199-4	211-7	224-3	236-2	248-4	260-5	272-8	284-7	296-6		308-2	319-7	330-8	341-2	351-4	0-5	8-4	14-7	18-0	18-0
147-7	148-8	148-9	149-9	151-7	162-3	163-1	153-3	153-5		153-8	153-4	153-1	152-8	152-1	151-4	150-6	149-9	149-1	148-3
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
140-4	146-7	152-8	158-8	164-9	171-0	176-9	182-6	188-7	1922	194-3	200-1	205-4	210-7	216-0	220-9	225-8	230-1	233-9	237-5
199-0	200-8	194-1	189-6	194-5	206-1	221-0	238-2	255-6		272-9	288-6	301-1	306-7	302-7	295-8	297-8	308-0	323-0	340-4
159-7	161-9	164-0	165-9	167-9	169-7	171-2	172-7	173-8		174-7	175-4	175-7	175-7	175-3	174-7	173-8	172-6	171-5	170-1
143-6	150-4	168-6	181-0	193-3	204-7	218-3	230-9	242-4		256-1	268-7	281-5	294-1	306-6	318-1	331-3	344-2	356-6	9-2
158-7	159-8	161-1	162-1	163-0	163-9	164-8	165-2	165-6		166-0	165-9	165-9	165-8	165-2	164-6	164-0	163-2	162-4	161-6
265-2	271-7	278-3	285-2	292-2	299-2	306-5	313-6	320-8	1923	328-1	335-2	342-6	349-7	356-9	3-8	10-9	18-0	24-8	31-7
180-5	174-0	176-3	186-6	201-1	217-8	235-0	252-2	268-4		281-6	289-3	287-8	280-3	279-2	287-4	301-4	318-4	336-6	356-4
183-1	185-3	187-5	189-6	191-8	193-9	195-9	197-9	199-6		201-2	202-7	203-9	204-8	205-4	205-9	205-5	205-5	205-0	202-0
216-5	222-5	225-8	225-2	221-2	215-1	210-8	210-3	214-0		220-2	228-2	237-5	247-4	258-1	268-9	280-3	291-7	303-6	315-3
169-3	170-5	171-7	172-9	173-9	174-9	175-9	176-5	177-1		177-8	177-9	178-1	178-2	177-8	177-4	177-1	176-3	175-5	174-8
152-7	159-0	165-3	171-5	177-9	184-2	190-5	196-9	203-3	1924	209-5	215-9	222-2	228-5	234-9	241-2	247-4	253-7	259-8	266-0
158-4	166-8	181-3	197-4	214-6	231-9	248-3	262-5	271-8		272-6	285-6	292-0	267-6	280-8	296-7	314-8	333-1	351-2	7-9
206-9	208-9	211-1	213-3	215-5	217-7	220-0	222-2	224-3		226-4	228-4	230-2	231-9	233-4	234-7	235-6	236-5	236-9	236-9
181-2	193-5	206-2	218-6	231-1	243-7	256-2	268-7	281-0		293-7	306-0	318-2	330-2	342-5	354-5	6-1	17-8	28-8	39-8
170-7	180-9	182-1	183-4	184-5	185-6	186-7	187-4	188-2		189-0	189-1	189-6	190-0	189-8	189-5	189-4	188-8	188-2	187-6
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
303-9	306-9	311-0	315-3	320-4	325-8	331-2	337-1	343-2	1925	349-3	355-6	1-9	8-2	14-7	20-9	27-4	33-8	40-3	46-6
160-9	176-9	194-0	211-5	228-0	242-9	254-1	257-2	251-3		245-9	249-7	260-5	275-6	292-8	310-9	329-0	345-9	0-5	9-8
232-1	233-8	235-8	237-9	238-0	242-2	244-4	246-7	249-0		251-3	253-6	255-7	257-9	259-9	261-8	263-7	265-3	266-6	267-0
129-8	141-2	152-8	164-7	176-4	188-6	199-7	213-0	225-4		237-8	250-5	263-0	275-4	287-9	300-5	313-1	325-5	338-1	350-5
190-0	191-2	192-4	193-6	194-7	195-8	197-0	197-9	198-8		199-7	200-2	200-7	201-3	201-3	201-4	201-4	200-8	200-3	199-8
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
164-8	171-2	177-6	184-3	190-8	197-5	204-0	210-6	217-5	1926	224-3	231-2	238-1	244-9	252-0	258-9	266-0	273-1	280-2	287-2
172-3	189-9	208-2	223-5	236-0	241-3	238-5	231-0	231-2		241-0	255-1	271-6	289-3	307-3	324-5	339-5	350-1	352-1	345-5
260-4	261-6	262-9	264-5	266-2	268-2	270-3	272-4	274-4		277-0	279-3	281-8	284-0	286-4	283-6	290-9	293-1	295-1	297-1
215-3	226-8	238-3	249-4	260-2	267-5	280-1	288-8	296-0		300-9	302-3	300-3	295-0	289-4	286-8	288-5	293-0	299-8	308-4
200-2	201-4	202-6	203-7	204-9	206-1	207-2	208-2	209-2		210-2	210-9	211-5	212-3	212-5	212-7	212-9	212-6	212-3	211-9
20-7	18-3																		

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of I.S.Y.		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1927	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22
	Mercury	500.0	70.9	74.8	82.7	88.8	94.9	101.9	107.1	113.2	119.4	125.8	131.9	138.3	144.6	151.0	157.5	163.8
	Jupiter	332.9	347.1	351.5	355.2	358.8	362.4	365.9	369.2	372.4	375.6	378.8	382.0	385.2	388.4	391.6	394.8	398.0
	Venus	326.1	328.1	330.5	332.4	334.3	335.9	337.2	338.3	339.2	339.6	339.8	339.6	339.0	338.1	337.1	335.8	334.4
	Saturn	33.5	47.2	57	68.7	80.1	91.2	102.3	112.6	122.8	131.8	140.2	147.0	151.5	152.0	150.0	144.0	138.6
1928	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21
	Mercury	509.9	317.7	325.2	332.9	340.4	347.0	355.1	362.4	369.6	376.8	383.9	390.9	397.8	404.6	411.4	418.1	424.8
	Jupiter	342.1	350.2	357.9	365.2	372.4	379.5	386.6	393.6	400.6	407.6	414.6	421.6	428.6	435.6	442.6	449.6	456.6
	Venus	353.8	356.2	358.6	361.0	363.4	365.8	368.2	370.6	373.0	375.4	377.8	380.2	382.6	385.0	387.4	389.8	392.2
	Saturn	338.2	350.5	362.8	375.1	387.4	399.7	412.0	424.3	436.6	448.9	461.2	473.5	485.8	498.1	510.4	522.7	535.0
1929	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22
	Mercury	81.4	86.4	91.6	97.1	102.5	108.2	114.1	119.9	126.0	132.0	138.1	144.4	150.7	157.0	163.4	169.8	176.4
	Jupiter	356.5	362.2	367.9	373.6	379.3	385.0	390.7	396.4	402.1	407.8	413.5	419.2	424.9	430.6	436.3	442.0	447.7
	Venus	21.5	28.2	34.9	41.6	48.3	55.0	61.7	68.4	75.1	81.8	88.5	95.2	101.9	108.6	115.3	122.0	128.7
	Saturn	12.5	6.6	1.3	35.9	1.4	6.2	13.3	21.7	31.1	41.1	51.7	62.5	73.7	85.2	96.9	108.2	120.5
1930	Mars	246.1	245.8	245.5	245.1	244.4	243.7	242.9	242.1	241.3	240.6	239.9	239.2	238.5	237.8	237.1	236.4	235.7
	Mercury	327.5	335.3	343.0	350.7	358.3	365.9	373.5	381.1	388.7	396.3	403.9	411.5	419.1	426.7	434.3	441.9	449.5
	Jupiter	10.5	26.3	37.8	44.1	50.3	56.6	62.9	69.2	75.5	81.8	88.1	94.4	100.7	107.0	113.3	119.6	125.9
	Venus	49.1	51.1	53.2	55.4	57.7	59.9	62.4	64.7	67.0	69.4	71.7	73.9	76.0	78.0	80.0	81.9	83.8
	Saturn	16.3	28.5	40.8	52.9	65.1	77.1	89.1	100.9	112.7	124.3	135.8	147.3	158.5	169.5	180.3	190.4	200.7
1931	Mars	257.1	256.9	256.7	256.6	256.5	256.3	256.2	256.0	255.9	255.7	255.6	255.4	255.3	255.1	255.0	254.8	254.7
	Mercury	327.5	335.3	343.0	350.7	358.3	365.9	373.5	381.1	388.7	396.3	403.9	411.5	419.1	426.7	434.3	441.9	449.5
	Jupiter	10.5	26.3	37.8	44.1	50.3	56.6	62.9	69.2	75.5	81.8	88.1	94.4	100.7	107.0	113.3	119.6	125.9
	Venus	49.1	51.1	53.2	55.4	57.7	59.9	62.4	64.7	67.0	69.4	71.7	73.9	76.0	78.0	80.0	81.9	83.8
	Saturn	16.3	28.5	40.8	52.9	65.1	77.1	89.1	100.9	112.7	124.3	135.8	147.3	158.5	169.5	180.3	190.4	200.7
1932	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21
	Mercury	344.1	351.9	359.4	366.8	374.1	381.4	388.7	395.9	403.1	410.3	417.5	424.6	431.7	438.8	445.8	452.8	459.8
	Jupiter	0.0	352.8	354.4	356.0	357.6	359.2	360.8	362.4	364.0	365.6	367.2	368.8	370.4	372.0	373.6	375.2	376.8
	Venus	108.1	109.3	109.9	110.7	111.5	112.3	113.1	113.9	114.7	115.5	116.3	117.1	117.9	118.7	119.5	120.3	121.1
	Saturn	45.4	55.5	64.8	73.7	79.3	82.9	86.4	89.9	93.4	96.9	100.4	103.9	107.4	110.9	114.4	117.9	121.4
1933	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22
	Mercury	127.9	128.7	130.7	133.1	136.7	140.6	145.1	150.0	155.2	160.6	166.4	172.2	178.4	184.7	191.1	197.6	204.5
	Jupiter	334.8	343.2	351.4	359.2	366.8	374.3	381.7	389.1	396.5	403.9	411.3	418.7	426.1	433.5	440.9	448.3	455.7
	Venus	140.4	139.6	139.2	138.9	138.3	137.6	136.9	136.2	135.5	134.8	134.1	133.4	132.7	132.0	131.3	130.6	129.9
	Saturn	551.8	10.2	22.5	34.9	47.2	59.4	71.7	83.9	95.9	107.8	119.6	131.4	143.2	155.0	166.8	178.6	190.4
1934	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22
	Mercury	359.7	7.4	15.0	22.3	29.7	36.7	43.9	51.0	57.9	64.8	71.6	78.1	84.9	91.2	97.8	104.1	110.3
	Jupiter	335.7	352.4	369.1	385.8	402.5	419.2	435.9	452.6	469.3	486.0	502.7	519.4	536.1	552.8	569.5	586.2	602.9
	Venus	174.1	172.8	171.5	170.7	169.3	168.3	167.2	166.0	164.8	163.6	162.4	161.2	160.0	158.8	157.6	156.4	155.2
	Saturn	313.4	323.1	333.8	344.5	355.7	366.9	378.1	389.3	400.5	411.7	422.9	434.1	445.3	456.5	467.7	478.9	490.1
1935	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21
	Mercury	168.4	165.3	163.6	162.8	162.2	161.4	160.6	159.8	159.0	158.2	157.4	156.6	155.8	155.0	154.2	153.4	152.6
	Jupiter	348.1	357.2	366.3	375.4	384.5	393.6	402.7	411.8	420.9	430.0	439.1	448.2	457.3	466.4	475.5	484.6	493.7
	Venus	208.2	207.1	205.8	204.5	203.1	201.8	200.4	199.0	197.6	196.2	194.8	193.4	192.0	190.6	189.2	187.8	186.4
	Saturn	34.1	45.8	57.5	69.1	80.5	91.7	102.4	112.6	122.6	132.6	142.6	152.6	162.6	172.6	182.6	192.6	202.6
1936	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21
	Mercury	14.9	22.1	29.4	36.5	43.5	50.7	57.5	64.4	71.2	77.8	84.5	91.2	97.5	104.1	110.4	116.9	123.2
	Jupiter	2.7	20.8	36.6	48.5	59.3	69.1	78.0	86.0	93.9	101.8	109.7	117.6	125.5	133.4	141.3	149.2	157.1
	Venus	241.3	241.2	240.5	239.7	238.7	237.4	236.0	234.6	233.2	231.8	230.4	229.0	227.6	226.2	224.8	223.4	222.0
	Saturn	339.3	351.6	363.9	376.2	388.5	400.8	413.1	425.4	437.7	450.0	462.3	474.6	486.9	499.2	511.5	523.8	536.1
1937	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22	Je 12	Je 12	Je 22
	Mercury	223.3	222.0	220.2	217.8	214.8	211.6	208.7	205.8	202.9	200.0	197.1	194.2	191.3	188.4	185.5	182.6	179.7
	Jupiter	14.6	27.5	32.9	38.6	44.3	50.0	55.7	61.4	67.1	72.8	78.5	84.2	89.9	95.6	101.3	107.0	112.7
	Venus	272.6	273.5	274.0	274.1	274.1	273.6	272.7	271.7	270.5	269.1	267.8	266.5	265.2	263.9	262.6	261.3	260.0
	Saturn	9.0	2.4	37.9	356.0	0.0	5.4	12.2	19.7	27.1	34.4	41.7	49.0	56.3	63.6	70.9	78.2	85.5
1938	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21	Je 11	Je 11	Je 21
	Mercury	29.7	36.8	43.5	50.3	57.2	64.0	70.7	77.3	83.7	90.4	96.9	103.4	109.8	116.2	122.6	128.9	135.2
	Jupiter	13.4	11.2	4.2	4.9	15.2	30.3	45.1	60.8	76.5	92.2	107.9	123.6	139.3	155.0	170.7	186.4	202.1
	Venus	301.9	303.6	305.2	306.5	307.5	308.3	308.6	308.7	308.4	307.8	307.0	306.0	304.8	303.4	301.8	300.0	298.0
	Saturn	16.9	29.1	41.5	53.7	65.7	77.7	89.5	101.5	113.2	124.9	136.3	147.7	159.0	170.3	181.6	192.9	204.2

Mes. Vrish. Mith. Kat. Sim. Kan. Tul. Vrsch. Dhan. Mak. Kum. Min. Asv. Bhar. Krit. Rohi. Mrit. Ardh. Punar. Push. Ashl.

30 60 90 120 150 180 210 240 270 300 330 360 133 267 402 533 667 800 933 1067 1200

P.G. -contd.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	210	220	230	250	260	270	280	290	300	310	320	330	340	350	360			
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	1923	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 8	Mr 18	Mr 28	Ap 7
177-1	183-6	190-3	197-1	203-8	210-8	217-6	224-7	231-8	238-9	246-1	253-4	260-7	268-1	275-8	283-1	290-6	298-2	306-0	
193-2	200-0	209-9	202-5	198-5	203-0	215-2	230-6	247-6	264-9	282-4	298-1	310-6	316-5	315-1	306-4	307-3	313-2	333-1	
331-7	330-6	329-7	329-3	329-0	329-2	329-8	330-6	331-7	333-1	334-8	336-6	340-3	343-0	343-3	317-7	350-1	352-3	332-2	
136-6	141-8	148-7	157-2	166-7	177-1	187-6	199-0	210-5	222-2	234-6	246-4	258-5	270-8	283-1	295-2	307-6	320-0	332-2	
220-1	221-2	222-2	223-2	224-4	225-7	226-8	227-9	228-0	230-2	231-1	232-1	233-0	233-6	234-1	234-7	234-8	234-9	234-9	
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	1929	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
68-5	71-6	74-3	75-8	76-6	75-6	73-5	70-4	66-8	63-2	61-1	59-0	60-1	61-4	63-6	66-9	70-4	7-7	79-0	
194-5	189-6	183-2	185-6	196-2	210-5	226-9	244-4	261-6	277-4	291-1	298-7	297-3	289-8	288-6	297-5	310-7	325-3	346-8	
13-2	11-9	10-5	9-1	7-9	6-9	6-3	5-6	5-6	5-9	6-5	7-4	8-6	10-1	11-7	13-0	15-7	17-8	20-0	
199-4	211-7	224-3	236-2	248-4	260-5	272-8	284-7	296-6	308-2	319-7	330-8	341-2	351-4	0-5	8-4	14-7	18-0	18-0	
230-1	231-1	232-1	233-1	234-3	235-5	236-6	237-7	238-8	240-0	241-0	242-0	243-3	243-8	244-3	245-2	245-5	245-8	246-0	
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	1930	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
189-8	196-6	203-4	210-5	217-5	224-7	231-9	239-1	246-5	254-0	261-4	268-9	276-6	284-4	292-1	300-0	307-7	315-5	323-4	
168-3	167-1	176-7	190-3	206-5	223-9	241-0	257-6	271-6	281-0	282-1	274-8	271-4	277-5	290-4	306-5	324-4	343-1	1-0	
52-0	51-5	50-7	49-6	48-4	47-1	45-7	44-4	43-3	42-4	41-7	41-4	41-5	41-8	42-6	43-6	44-9	46-5	48-1	
143-2	156-8	167-2	181-6	193-9	206-4	219-0	231-5	244-3	250-8	269-6	282-1	294-7	307-4	319-9	332-4	344-8	357-3	9-8	
240-3	241-2	242-1	243-0	244-1	245-2	246-3	247-5	248-7	249-8	250-9	252-0	253-1	254-0	254-9	255-7	256-1	256-5	257-0	
91-6	96-6	101-3	105-4	109-0	111-9	114-2	115-1	115-3	113-9	111-3	107-8	103-8	100-4	97-6	96-4	96-4	97-7	99-9	
157-4	170-3	186-3	203-4	220-8	237-3	254-2	263-1	266-4	260-8	255-0	258-5	270-0	283-3	302-5	320-7	338-9	356-2	10-9	
85-2	86-0	86-3	86-3	86-0	85-4	84-4	83-2	82-0	80-6	79-3	78-1	77-0	76-2	75-8	75-6	75-8	76-3	77-2	
215-9	221-0	223-5	222-1	217-1	211-1	207-7	208-5	212-9	219-6	227-8	237-5	247-4	258-5	269-3	280-8	292-3	304-1	315-8	
250-7	251-4	252-1	252-9	253-9	254-9	256-0	257-2	258-4	259-6	260-8	262-0	263-1	264-0	264-9	265-9	266-5	267-1	267-8	
204-3	210-2	217-4	224-4	231-7	239-0	246-4	254-2	261-7	269-4	277-1	284-9	292-7	300-6	308-5	316-3	324-3	332-1	340-0	
165-6	182-7	200-1	217-1	232-5	244-9	250-5	247-1	239-8	240-6	250-4	264-5	281-1	299-0	317-1	334-2	339-6	0-5	3-0	
113-7	115-2	116-4	117-5	118-3	118-7	118-7	118-5	118-0	117-1	116-1	114-8	113-5	112-2	111-0	109-8	108-9	108-4	108-1	
181-6	194-1	206-7	219-1	231-6	244-2	256-7	269-2	281-8	294-2	306-6	318-7	331-0	343-0	354-8	6-4	17-9	29-2	39-9	
261-4	261-9	262-4	263-0	264-0	265-0	266-9	267-1	268-3	269-4	270-5	271-8	272-9	274-0	275-1	276-2	277-0	277-8	278-5	
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	1933	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
108-3	114-1	119-5	124-7	129-5	134-2	138-2	141-7	144-7	146-6	147-7	147-3	145-7	143-1	139-0	135-7	132-3	129-3	128-4	
178-5	196-8	212-9	226-2	234-3	233-5	226-3	223-2	230-3	244-3	260-3	277-9	295-7	313-1	328-6	340-1	344-8	339-5	333-5	
139-0	140-9	142-8	144-5	146-0	147-2	148-4	149-7	149-6	149-7	149-5	149-0	148-3	147-2	145-9	144-7	143-4	142-1	140-9	
130-1	141-5	153-2	165-0	177-0	189-0	201-3	213-5	225-9	238-3	251-0	263-6	276-0	288-6	301-0	313-7	326-0	338-6	351-0	
272-3	272-7	273-1	273-5	274-4	275-3	276-1	276-9	277-9	278-4	279-6	280-8	281-9	283-0	284-2	285-4	286-5	287-5	288-5	
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	1934	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
218-1	225-3	232-4	239-8	247-1	254-8	262-4	270-0	277-8	285-5	293-4	301-4	309-2	317-0	324-8	332-8	340-6	348-0	356-0	
193-0	207-4	217-3	218-9	212-1	207-5	212-5	224-6	239-8	257-0	274-5	292-0	307-8	320-5	326-7	323-1	316-4	317-7	328-1	
163-0	165-1	167-2	169-2	171-2	173-0	174-7	176-2	177-5	178-6	179-3	179-7	179-9	179-7	179-1	178-2	177-3	176-1	174-7	
215-7	227-3	238-6	249-6	260-2	270-5	279-9	288-3	295-0	299-1	300-0	296-6	291-1	285-6	284-4	286-8	292-1	299-4	308-3	
283-8	284-0	284-2	284-5	285-2	285-9	286-7	287-7	288-7	289-8	291-0	292-2	293-4	294-6	295-8	296-9	298-0	299-1	300-1	
122-5	128-4	134-2	139-9	145-5	150-8	156-1	160-7	165-5	169-9	173-5	176-8	179-3	180-5	181-0	180-2	177-8	174-3	170-2	
199-3	203-6	198-7	192-4	194-6	204-9	219-5	236-2	253-0	270-9	287-3	300-7	308-4	307-3	299-9	298-8	307-0	321-4	220-4	
186-3	188-6	190-7	192-8	195-0	197-2	199-3	201-2	203-1	204-8	206-3	207-7	208-9	209-4	209-9	210-1	209-9	209-4	208-7	
163-2	175-7	188-0	200-6	213-2	225-8	238-3	250-9	263-7	276-2	288-9	301-6	314-1	326-5	338-9	351-3	3-4	15-7	27-7	
295-8	295-8	295-8	295-8	296-3	296-8	297-4	298-4	299-4	300-3	301-5	302-7	303-8	305-0	306-2	307-5	308-7	309-9	311-0	
235-1	242-1	249-5	256-7	264-2	271-6	279-3	287-1	294-7	302-5	310-3	318-0	325-6	333-4	341-2	348-6	356-1	3-8	11-0	
185-5	177-5	176-9	185-9	199-5	215-8	233-0	250-5	266-8	281-1	290-8	291-4	284-7	280-0	287-4	300-2	316-3	334-8	353-0	
210-2	212-3	214-4	216-6	218-9	221-1	223-2	225-6	227-7	229-8	231-7	233-8	235-5	237-1	238-5	239-6	240-4	241-1	241-3	
135-2	140-9	148-3	157-1	166-8	177-1	188-0	199-5	210-9	222-7	234-9	246-7	258-9	271-3	283-5	295-8	308-2	320-5	332-8	
308-3	308-1	307-0	307-7	308-0	308-3	308-7	309-5	310-3	311-2	312-3	313-4	314-5	315-7	316-9	318-2	319-4	320-6	321-9	
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28	1937	Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
135-5	141-5	147-7	153-6	159-6	165-4	171-2	176-9	182-4	188-0	193-3	198-1	203-6	209-5	211-6	215-3	218-5	220-7	222-1	
159-8	166-9	179-6	195-3	212-4	229-9	246-4	261-4	272-5	275-7	269-7	264-4	266-2	279-3	294-8	312-3	330-7	349-0	6-0	
235-8	237-4	239-3	241-4	243-4	245-6	247-8	250-2	252-4	254-6	257-0	259-2	261-4	263-6	265-5	267-4	269-1	271-6	271-9	
290-3	212-7	224-9	237-2	249-3	261-5	273-5	285-5	297-4	308-9	320-2	331-1	341-5	351-0	359-6	6-9	12-0	13-7	12-3	
321-5	321-1	320-7	320-2	320-3	320-4	320-5	321-1	321-7	322-4	323-5	324-6	325-6	326-8	328-0	329-2	330-5	331-8	333-0	
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	1938	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
255-3	262-1	269-1	276-2	283-4	290-9	298-2	305-7	313-1	320-5	328-0	335-4	342-8	350-2	357-3	4-7	11-8	18-9	26-0	
150-6	174-9	192-0	209-4	226-6	241-8	253-9	259-6	256-0	248-9	250-0	259-6	273-9	291-0	308-8	327-2	344-4	359-8	10-9	
264-6	265-5	266-7	268-4	270-0	271-9	274-0	276-1	278-2	280-6	282-9	285-2	287-6	290-0	292-3	294-6	296-9	298-9	300-9	
145-4	157-4	169-9	182-2	194-7	207-1	219-6	232-1	244-6	257-5	270-2	282-8	295-3	308-1	320-5	333-1	345-4	357-9	10-4	
335-4	334-8	334-2	333-6	333-5	333-4	333-2	333-7	334-2	334-7	335-5	336-3	337-1	338-3	339-5	340-7	342-0	343-3	344-6	
147-8	154-2	160-																	

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of U.S.Y.		0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1939	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 258-7	263-6	268-3	272-5	276-2	279-1	280-8	281-9	282-0	280-5	277-7	275-6	269-8	272-9	272-3	274-2	277-0	280-9
	Jupiter	.. 346-6	344-9	353-0	7-7	25-1	43-7	62-8	81-1	98-3	112-0	119-3	117-3	109-7	109-6	119-4	133-5	150-2	167-9
	Venus	.. 330-0	332-2	334-4	336-4	338-4	340-0	341-6	342-8	343-8	344-5	344-8	344-7	344-4	343-6	342-6	341-4	340-1	338-7
	Saturn	.. 322-7	334-6	346-6	358-7	10-9	22-9	35-1	47-2	59-4	71-5	83-6	96-0	108-3	120-5	132-7	145-2	157-5	170-0
1940	Mars	Eng. Ap 12	Ap 22	My 2	My 12	My 22	Je 1	Je 11	Je 21	Je 11	Je 11	Je 21	Au 1	Au 10	Au 20	Au 30	S 9	S 19	S 29
	Mercury	.. 44-4	50-9	57-4	64-0	70-5	76-9	83-4	89-6	96-3	102-6	109-0	115-2	121-6	128-0	134-4	140-9	147-1	153-5
	Jupiter	.. 332-8	345-6	2-5	20-8	40-0	58-8	76-1	90-9	100-2	99-7	92-5	90-6	98-8	112-4	129-0	146-5	164-5	181-7
	Venus	.. 357-6	0-0	2-4	4-8	7-0	9-4	11-5	13-5	15-5	17-0	18-5	19-7	20-0	21-1	21-3	21-2	20-7	19-1
	Saturn	.. 45-6	55-6	64-6	72-2	78-0	80-7	80-2	79-6	69-9	65-2	63-8	66-7	71-5	79-6	88-7	98-3	108-5	119-2
1941	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1942	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1943	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1944	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1945	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1946	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1947	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1948	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1949	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	.. 358-3	10-8	23-0	35-4	47-7	59-9	72-3	84-4	96-5	108-7	120-7	132-9	144-9	156-9	168-9	180-9	192-7	204-3
1950	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 12	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 283-0	289-0	296-4	303-2	309-8	316-3	322-5	328-5	334-3	339-8	344-6	348-8	352-1	354-5	355-7	355-5	353-9	351-2
	Jupiter	.. 340-1	358-2	16-9	35-8	53-8	69-2	80-0	82-0	75-4	71-8	78-1	91-0	107-5	125-0	143-3	160-8	177-0	189-9
	Venus	.. 25-3	27-6	29-9	32-3	34-7	37-1	39-4	41-8	44-1	46-2	48-3	50-3	51-9	53-5	54-7	55-8	56-5	56-8
	Saturn	..																	

F.G.—contd.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 8	Mr 18	Mr 28	Ap 7
285.3	290.2	296.0	301.7	307.9	314.1	320.5	327.4	334.0	1940	340.5	347.3	354.1	0.7	7.6	14.2	20.8	27.5	34.2	40.8
185.5	202.2	216.4	226.3	227.8	221.1	216.5	221.7	233.5		249.0	266.2	284.6	301.4	317.5	330.3	336.7	333.9	327.0	327.6
337.3	336.2	335.2	334.4	334.1	334.1	334.4	334.1	336.2		337.4	338.9	340.7	342.6	344.6	346.9	349.1	351.5	353.8	356.3
182.6	194.7	207.4	219.7	232.3	244.8	257.4	269.8	282.4		294.6	307.0	319.3	331.4	343.5	355.2	6.9	18.3	29.4	40.1
4.6	3.8	3.0	2.1	1.5	0.9	0.3	0.2	0.1		0.1	0.6	1.1	1.6	2.5	3.4	4.4	5.6	6.8	8.1
O 9	O 19	O 29	N 8	N 18	N 28	D 8	D 18	D 28		Ja 7	Ja 17	Ja 27	F 6	F 16	F 26	Mr 8	Mr 18	Mr 28	Ap 7
159.9	166.3	173.0	179.2	185.6	192.3	198.9	205.3	212.0	1941	218.4	225.2	232.0	238.7	245.3	252.0	258.8	265.7	272.7	279.5
197.0	208.6	212.7	207.6	201.5	203.4	214.0	228.6	245.3		263.0	280.3	296.8	310.3	318.6	317.4	310.1	308.5	317.4	331.2
18.9	17.6	16.2	14.8	13.5	12.4	11.4	10.9	10.5		10.7	11.1	11.9	12.9	14.3	15.9	17.6	19.5	21.7	23.9
130.4	141.8	153.5	165.4	177.3	189.6	201.8	214.1	226.4		239.1	251.7	264.3	276.7	289.3	301.8	314.4	326.8	339.3	351.8
19.7	18.9	18.1	17.2	16.5	15.8	15.0	14.6	14.2		13.9	14.1	14.3	14.6	15.4	16.2	16.9	18.0	19.1	20.3
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
349.7	346.2	345.4	345.6	347.2	349.5	352.6	356.4	0.5	1942	5.2	10.2	15.4	20.9	26.5	30.0	38.0	44.1	49.9	55.8
196.4	194.1	186.5	186.4	195.0	208.7	229.9	242.1	259.8		276.2	290.5	300.1	301.3	294.3	290.8	296.8	309.8	326.3	344.4
56.9	56.7	56.0	55.1	53.8	52.5	51.5	49.9	48.6		47.5	46.8	46.3	46.1	46.5	47.0	47.8	49.0	50.4	52.4
216.1	227.5	238.8	249.8	260.3	270.3	279.4	287.4	293.5		297.2	297.0	292.6	286.8	282.5	281.9	285.3	291.3	299.1	308.1
34.8	34.1	33.4	32.6	31.8	31.0	30.1	29.5	28.9		28.4	28.4	28.3	28.3	28.8	29.3	29.9	30.9	31.9	32.9
172.0	178.7	185.4	192.0	198.7	205.5	212.3	219.1	226.8	1943	233.1	240.1	247.4	254.5	261.8	269.0	276.6	284.0	291.3	299.0
172.3	169.1	175.8	188.8	204.7	221.6	238.9	255.9	270.8		281.6	285.1	279.6	273.8	277.6	289.1	304.6	322.4	340.7	359.0
89.4	90.2	90.8	90.9	90.7	90.2	89.5	88.4	87.1		85.8	84.5	83.2	82.1	81.1	80.5	80.2	80.3	80.6	81.3
163.9	176.1	188.7	201.2	213.7	226.3	239.0	251.5	264.2		277.0	289.4	302.2	314.7	327.2	339.5	351.8	3.9	16.2	28.3
49.9	49.3	48.7	48.2	47.4	46.6	45.7	45.0	44.3		43.5	43.2	42.9	42.5	42.8	43.1	43.3	44.1	44.0	45.7
54.7	56.6	57.5	56.8	55.0	51.9	48.9	45.9	43.7	1944	42.0	43.1	44.5	47.0	49.9	53.7	57.5	62.2	67.0	72.0
157.5	169.0	184.3	201.2	218.5	235.7	251.0	263.4	270.1		265.5	258.2	259.3	269.0	283.4	300.5	318.7	337.1	354.6	10.2
117.3	118.9	120.3	121.3	122.2	122.9	123.0	123.0	122.6		121.9	120.9	119.7	118.4	117.1	115.8	114.7	113.6	112.9	112.6
134.0	140.5	148.1	157.1	166.8	177.5	188.2	199.8	211.3		223.2	235.3	247.2	259.6	271.1	284.1	296.4	328.7	321.0	333.0
64.9	64.6	64.3	63.9	63.2	62.5	61.7	60.9	60.1		59.2	58.6	58.0	57.4	57.4	57.3	57.3	57.9	58.5	59.0
184.6	191.3	198.2	205.1	212.2	219.2	226.1	233.4	240.7	1945	248.1	255.3	262.7	270.3	277.9	285.7	293.3	301.1	309.0	316.7
163.9	180.4	197.8	215.2	231.1	244.4	252.3	251.5	243.3		241.6	249.6	262.8	279.1	296.8	314.9	332.6	348.7	1.1	6.0
142.4	144.5	146.4	148.1	149.6	151.0	152.2	153.0	153.7		153.9	153.8	153.5	152.8	151.8	150.5	149.3	147.9	146.6	145.6
200.9	213.3	225.5	237.7	250.1	262.2	274.2	286.0	297.8		310.1	320.5	331.1	341.4	350.8	359.3	5.8	10.0	11.1	7.7
79.1	79.1	79.0	79.0	78.4	77.8	77.3	76.4	75.5		74.7	74.0	73.3	72.5	72.2	71.9	71.6	71.9	72.2	72.5
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
83.7	88.2	92.4	95.9	98.8	100.8	101.5	101.0	99.5	1946	96.5	92.4	88.8	85.8	83.3	82.0	83.4	85.2	87.9	91.1
177.4	194.8	211.4	225.5	235.3	240.7	229.7	225.4	230.5		242.8	258.6	273.8	293.7	311.0	327.2	340.4	347.2	344.3	379.1
166.2	168.3	170.4	172.5	174.5	176.4	178.1	179.8	181.1		182.2	183.1	183.7	183.9	183.6	183.6	182.9	181.8	180.8	187.5
145.9	158.1	170.6	183.0	195.3	207.8	220.3	232.9	246.2		258.3	270.7	283.5	296.0	308.8	321.3	333.0	346.2	358.6	11.0
92.0	93.1	93.3	93.6	93.3	93.0	92.6	91.8	91.0		90.3	89.5	88.7	87.8	87.3	86.8	86.2	86.2	86.1	86.1
197.8	204.7	211.7	219.0	226.2	233.3	240.7	248.1	255.7	1947	263.2	270.8	278.6	286.4	294.2	302.1	309.9	317.8	325.8	333.6
101.2	206.2	217.7	221.7	216.7	210.3	212.5	223.1	238.0		254.7	272.5	289.7	306.3	320.1	328.3	327.8	320.3	318.9	327.0
189.5	191.7	193.9	196.1	198.3	200.4	202.6	204.6	206.5		208.3	209.9	211.2	212.4	213.3	214.0	214.2	214.3	213.9	213.3
213.8	217.7	218.4	214.7	208.9	203.7	202.5	205.1	210.9		218.4	227.5	237.2	247.8	258.6	269.9	281.6	293.2	304.9	316.8
106.1	106.6	107.1	107.5	107.5	107.4	107.4	106.8	106.2		105.5	104.7	103.9	103.0	102.3	101.6	100.9	100.6	100.3	100.0
102.1	107.7	113.0	117.8	122.5	126.3	130.0	132.6	134.5	1948	135.4	135.0	133.7	130.2	126.6	122.7	119.2	117.1	115.9	115.8
199.3	205.7	203.2	195.6	195.2	204.2	217.7	233.9	251.4		269.0	285.7	300.2	301.9	311.1	304.6	300.4	307.1	319.8	336.3
213.5	215.6	217.7	220.0	222.1	224.4	226.6	228.8	231.1		233.2	235.3	237.2	239.1	240.7	242.2	243.5	244.5	245.2	245.7
183.2	195.4	208.1	220.4	233.0	245.5	258.1	270.6	282.9		295.4	307.7	319.9	331.9	344.0	355.9	7.4	18.9	29.9	40.5
118.7	119.4	120.1	120.8	121.0	121.2	121.4	120.0	120.6		120.3	119.6	118.9	118.1	117.3	116.5	115.6	115.1	114.6	114.0
212.3	219.1	226.3	233.6	241.1	248.5	256.0	263.7	271.2	1949	279.1	286.9	294.7	302.7	310.6	318.4	326.2	334.1	342.0	349.7
188.8	181.1	178.6	186.1	197.6	213.8	230.6	248.1	265.0		280.3	291.5	294.8	289.9	283.5	287.6	298.6	314.3	331.9	350.6
239.6	241.3	243.1	245.0	247.1	249.3	251.5	253.8	256.1		258.4	260.6	263.0	265.2	267.3	269.4	271.4	273.1	274.7	278.1
130.8	142.4	154.2	166.1	178.0	190.3	202.3	214.9	227.2		239.8	252.3	264.9	277.3	289.8	302.6	314.9	327.6	340.0	352.3
139.8	131.7	132.6	133.5	134.0	134.5	134.4	134.8	134.7		134.5	133.8	133.1	132.5	131.7	130.9	130.1	129.4	128.7	128.1
117.3	123.0	128.9	134.3	139.7	144.8	149.5	154.1	158.0	1950	161.5	164.5	166.5	167.5	167.1	165.2	162.6	158.9	155.0	151.2
162.1	168.7	178.3	193.6	210.5	227.9	244.3	260.3	272.4		278.1	274.6	267.5	268.7	278.4	293.2	310.5	328.5	346.9	4.7
268.8	269.7	270.9	272.2	273.9	275.6	277.6	279.7	282.0		284.1	286.4	288.9	291.2	293.5	296.0	298.3	300.0	302.7	304.7
216.5	227.9	239.2	249.9	260.4	270.1	279.2	286.6	292.2		294.6	293.4	288.8	280.9	279.0	280.0	283.8	290.6	298.7	308.1
142.5	143.5	144.5	145.5	146.7	146.9	147.5	147.6	147.7		147.8	147.4	147.0	146.6	145.8	145.0	144.3	143.5	142.7	141.9
228.1	235.2	242.4	249.9	257.3	265.0	272.6	280.1	288.0	1951	295.8	303.6	311.5	319.2	327.2	334.8	342.5	350.1	357.8	5.2
158.7	173.2	190.0	207.1	224.5	240.6	258.8	261.3	260.2		252.7	251.0	258.4	272.4	288.8	306.8	324.9	342.8	358.7	11.5
303.3	302.9	302.9	303.4	304.1	305.1	306.3	307.9	309.7		311.6	313.7	315.9	318.1	320.6	322.9	325.3	327.7	330.2	332.5
164.5	177.0	189.3																	

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 38, or the method at p. 7. For mean

Day of I.S.Y.		0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	
	Eng.	Ap 13	Ap 23	Ma 3	My 13	My 23	Je 2	Je 12	Je 22	Jul 2	Jul 12	Jul 22	Aug 1	Aug 11	Aug 21	Aug 31	S 10	S 20	S 30	
1951	Mars	..	9.1	16.5	23.9	31.0	38.3	45.3	52.2	59.3	66.2	72.8	79.5	86.0	92.8	99.2	105.5	111.9	118.1	124.4
	Mercury	..	14.7	15.6	8.4	6.3	14.8	28.7	45.8	64.4	83.3	101.6	118.4	132.0	139.4	137.2	131.2	129.9	139.0	152.6
	Jupiter	..	333.8	336.0	338.3	340.4	342.4	344.2	345.7	347.2	348.3	349.1	349.8	349.8	349.7	349.1	348.3	347.0	343.8	344.5
	Venus	..	35.1	46.9	58.6	70.0	81.4	92.3	103.0	113.0	122.7	131.0	138.3	143.5	145.1	144.5	139.3	133.2	129.1	129.6
	Saturn	..	155.2	154.6	154.0	153.4	153.3	153.3	153.2	153.7	154.2	154.6	155.5	156.4	157.3	158.4	159.5	160.6	161.9	163.2
1952	Mars	..	202.2	199.3	195.7	192.7	189.1	188.7	188.9	190.2	192.6	195.8	199.8	204.3	209.5	214.8	220.8	227.0	233.4	240.1
	Mercury	..	351.0	347.2	353.4	6.1	23.1	41.6	60.5	79.2	96.7	111.7	121.1	120.9	113.8	111.2	119.0	131.9	148.3	167.6
	Jupiter	..	1.6	4.0	6.1	8.9	11.2	13.4	15.6	17.7	19.6	21.3	22.9	24.2	25.2	25.9	26.2	26.3	25.9	2.3
	Venus	..	340.6	353.0	3.2	17.7	30.0	42.2	54.4	66.7	79.0	91.3	103.4	115.8	127.9	140.2	152.4	164.8	177.1	139.3
	Saturn	..	168.5	167.8	167.1	166.4	166.1	165.8	165.5	165.7	165.9	166.1	166.9	167.6	168.4	169.5	170.6	171.6	172.8	174.0
1953	Mars	..	24.0	31.0	38.0	45.0	51.8	58.8	65.6	72.2	78.9	85.5	92.2	98.5	105.0	111.5	117.8	124.3	130.6	136.8
	Mercury	..	332.7	344.7	0.6	18.8	37.6	56.6	74.5	90.1	101.2	103.7	97.3	92.9	98.4	111.0	127.0	144.5	162.3	180.0
	Jupiter	..	29.1	31.3	33.6	36.1	38.4	40.8	43.2	45.5	47.7	50.0	52.1	54.1	55.8	57.6	58.9	60.1	61.0	61.5
	Venus	..	1.2	353.0	352.1	353.3	357.8	4.0	12.3	21.5	31.5	41.8	52.6	63.6	75.2	86.6	98.3	110.3	122.3	134.3
	Saturn	..	181.4	180.6	179.8	179.1	178.6	178.1	177.6	177.6	177.6	177.6	178.1	178.6	179.2	180.1	181.0	181.9	183.1	184.3
1954	Mars	..	246.6	250.1	252.9	254.8	256.1	255.8	254.6	252.1	249.5	247.0	245.3	243.8	246.1	248.3	251.6	255.6	260.6	265.9
	Mercury	..	338.3	356.0	14.6	33.7	52.0	68.5	80.6	85.4	80.4	74.5	78.5	90.0	105.5	123.0	141.0	159.1	175.7	189.6
	Jupiter	..	56.8	58.6	60.6	62.7	64.9	67.1	69.5	71.7	74.1	76.4	78.6	80.9	83.2	85.2	87.2	89.1	90.8	92.8
	Venus	..	18.1	30.5	42.7	54.6	66.8	79.0	90.7	102.5	114.1	125.7	137.0	148.5	159.5	170.3	180.4	190.2	199.2	206.8
	Saturn	..	194.0	193.2	192.4	191.6	191.0	190.4	189.7	189.5	189.3	189.0	189.3	189.6	190.0	190.8	191.6	192.3	193.4	194.5
1955	Mars	..	38.6	45.2	52.0	58.6	65.4	71.9	78.4	85.0	91.4	98.0	104.4	110.7	117.1	123.4	130.0	136.2	142.5	148.9
	Mercury	..	351.9	11.1	29.1	46.2	59.8	66.1	62.9	56.0	58.1	68.2	83.7	100.9	119.1	137.5	154.7	169.9	180.6	182.8
	Jupiter	..	85.8	86.9	88.1	89.5	91.3	93.2	95.0	97.2	99.3	101.5	103.7	106.1	108.3	110.5	112.8	114.9	117.0	119.1
	Venus	..	323.8	335.8	347.7	359.9	12.0	24.3	36.4	48.6	60.8	72.8	85.2	97.3	109.6	127.8	134.1	146.5	158.9	171.3
	Saturn	..	206.2	205.4	204.6	203.9	203.2	202.5	201.7	201.3	200.9	200.5	200.6	200.7	200.9	201.5	202.1	202.6	203.5	204.5
1956	Mars	..	274.6	280.6	286.9	293.0	298.7	304.4	309.5	314.4	318.7	322.4	325.3	326.4	327.3	328.8	329.4	321.0	318.6	317.5
	Mercury	..	6.6	23.8	38.1	46.2	44.8	37.5	37.7	46.9	61.6	78.9	97.3	115.7	133.6	149.5	161.7	166.7	162.2	155.6
	Jupiter	..	116.8	116.8	117.1	117.7	118.6	119.7	121.0	122.8	124.5	126.4	128.5	130.5	132.7	134.8	137.1	139.3	141.5	143.7
	Venus	..	45.6	55.1	63.7	70.4	75.4	76.8	74.6	68.7	62.5	59.2	60.2	64.3	71.0	79.2	88.3	98.5	108.9	119.9
	Saturn	..	218.0	217.3	216.6	215.9	215.1	214.3	213.6	213.0	212.4	211.9	211.8	211.7	211.7	212.1	212.5	213.0	213.9	214.8
1957	Mars	..	53.4	59.7	65.8	72.2	78.3	84.8	91.1	97.2	103.7	109.8	116.3	122.6	128.7	135.9	141.7	148.1	154.5	160.8
	Mercury	..	16.5	26.2	26.7	19.8	17.2	25.0	39.0	55.4	74.8	93.5	111.7	128.4	142.2	149.2	147.5	139.9	135.5	147.8
	Jupiter	..	149.6	148.6	147.9	147.5	147.3	147.6	148.2	149.1	150.1	151.4	153.1	154.8	156.5	158.1	160.7	162.7	165.0	167.2
	Venus	..	359.7	12.1	24.4	36.7	49.1	61.3	74.5	85.7	97.8	109.9	122.0	134.0	146.1	158.1	170.1	182.9	193.8	205.3
	Saturn	..	228.6	229.0	228.4	227.8	227.0	226.2	225.5	224.8	224.1	223.5	223.2	222.9	222.7	222.9	223.1	223.4	224.1	224.8
1958	Mars	..	295.2	302.6	309.9	317.2	324.3	331.5	328.6	345.4	352.3	358.7	5.0	10.9	16.4	21.7	26.1	30.0	33.1	34.8
	Mercury	..	8.5	2.3	357.8	4.0	16.7	33.6	51.9	70.9	89.7	106.8	121.6	131.1	131.2	124.3	121.5	128.8	141.5	157.8
	Jupiter	..	183.5	182.2	180.9	179.8	178.8	178.1	177.6	177.4	177.6	178.2	179.1	180.1	181.5	183.0	184.7	186.4	188.5	190.6
	Venus	..	313.2	323.6	334.3	345.5	356.7	8.4	19.9	31.6	43.4	55.3	67.3	79.3	91.4	103.4	115.6	127.9	140.2	152.6
	Saturn	..	241.0	240.6	240.2	239.7	239.0	238.3	237.5	236.8	236.1	235.3	234.8	234.3	233.9	233.9	234.0	234.0	234.6	235.2
1959	Mars	..	68.5	74.1	79.9	85.8	91.7	97.7	103.8	109.9	116.0	122.0	128.3	134.6	141.0	147.2	153.7	160.2	166.5	173.2
	Mercury	..	339.3	343.3	355.1	11.1	29.2	48.1	67.1	86.0	100.4	111.4	114.2	107.7	103.7	108.8	120.8	137.0	154.7	172.0
	Jupiter	..	217.5	216.6	215.4	214.1	212.8	211.6	210.3	209.2	208.6	208.0	207.9	208.1	208.6	209.3	210.5	211.8	213.4	215.0
	Venus	..	35.6	47.3	59.0	70.4	81.8	92.5	103.1	113.1	122.6	130.7	137.7	142.4	142.5	141.6	135.6	129.8	126.7	127.0
	Saturn	..	251.9	251.7	251.5	251.2	250.6	250.0	249.3	248.6	247.9	247.1	246.4	245.7	245.1	245.0	244.9	244.8	245.2	245.6
1960	Mars	..	313.8	321.4	329.3	336.9	344.4	352.1	359.4	6.8	14.0	21.1	27.8	34.7	41.2	47.4	53.6	59.3	64.7	69.7
	Mercury	..	333.3	348.7	6.2	25.2	44.2	62.5	78.7	91.1	96.1	91.2	85.3	89.1	100.2	115.5	132.8	150.8	168.5	184.9
	Jupiter	..	250.0	250.2	249.8	249.2	248.3	247.2	245.9	244.6	243.2	242.0	240.7	240.2	239.6	239.4	239.6	240.1	240.9	242.1
	Venus	..	341.2	353.6	5.8	18.2	30.6	42.8	55.1	67.5	79.6	91.9	104.1	116.4	128.6	140.8	153.1	165.4	177.7	189.9
	Saturn	..	263.1	263.0	262.9	262.8	262.3	261.8	261.2	260.4	259.6	258.9	258.2	257.5	256.8	256.5	256.2	255.8	256.0	256.2
1961	Mars	..	85.0	90.3	95.1	100.4	105.7	111.3	117.1	122.8	128.8	134.8	140.8	147.2	153.2	159.7	166.1	172.7	179.2	185.9
	Mercury	..	343.9	2.3	21.3	39.7	56.7	70.3	77.0	74.3	67.3	68.5	78.7	93.8	111.1	129.4	147.3	164.5	179.3	189.7
	Jupiter	..	280.8	281.9	282.8	283.4	283.5	283.3	282.8	282.1	281.0	279.7	278.5	277.1	275.8	274.7	273.8	273.1	272.8	272.9
	Venus	..	357.1	351.6	349.8	351.7	356.8	3.6	12.1	21.5	31.7	42.0	53.0	64.1	75.7	87.3	99.0	110.9	122.4	134.8
	Saturn	..	273.8	274.0	274.2	274.4	274.0</													

Mesh. Vrish. Mith. Kat. Sim. Kan. Tul. Vrsch. Dhan. Mak. Kumb. Min. Aavn. Bhar. Krit. Rohi. Mrgi. Ardh. Punar. Push. Asles.

30 60 90 120 150 180 210 240 270 300 330 360 13.3 26.7 40.0 53.3 66.7 80.0 93.3 106.7 120.0

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
0 10	0 20	0 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 8	Mr 18	Mr 28	Ap 7
130-5	136-7	142-5	148-5	154-3	160-0	165-4	170-8	176-1	1952	181-3	186-0	190-6	194-6	198-2	201-0	203-4	204-4	204-7	208-4
108-9	185-0	201-4	220-6	234-7	244-5	245-6	238-6	234-4		240-1	252-1	267-7	285-1	303-0	320-9	337-1	350-6	357-3	358-4
343-1	341-8	340-7	339-8	339-3	339-1	339-2	339-8	340-6		341-7	343-2	344-6	346-6	350-7	350-7	352-4	355-3	357-7	0-0
132-7	139-6	147-8	157-1	167-0	177-6	188-6	200-1	211-8		223-5	235-6	247-7	260-1	272-2	284-7	297-0	309-2	321-6	334-0
164-4	165-6	166-8	167-9	168-9	169-9	170-9	171-4	171-9		172-5	172-5	172-6	172-6	172-1	171-0	171-1	170-4	169-7	168-0
																Mr 9	Mr 19	Mr 29	Ap 8
246-7	253-7	260-9	268-2	275-7	283-0	290-6	298-2	305-8	1953	313-4	321-0	328-4	336-2	343-6	351-0	358-4	5-7	13-1	20-3
183-7	200-2	215-5	226-8	230-5	225-1	218-9	222-0	232-4		247-0	264-2	281-7	299-4	316-0	330-1	338-8	338-1	330-6	329-5
2-3	23-1	21-7	20-4	19-0	17-9	16-8	16-0	15-6		15-5	15-9	16-5	17-4	18-6	20-1	21-9	23-7	26-7	27-6
201-6	214-0	226-2	238-3	250-5	262-6	274-6	286-4	298-2		309-6	320-6	331-2	341-4	350-6	358-5	4-8	8-3	8-3	4-4
175-1	176-3	177-5	178-8	179-8	180-8	181-9	182-6	183-3		184-1	184-3	184-5	184-7	184-4	184-1	183-8	183-1	182-4	181-8
									1954	197-7	203-6	209-2	214-9	220-4	225-7	231-0	235-8	240-4	244-5
143-2	149-3	155-5	161-6	167-6	173-7	179-8	185-8	191-8		260-7	278-6	295-2	309-0	319-7	321-3	314-5	310-7	314-7	329-9
195-6	208-5	214-7	212-1	204-6	204-4	213-0	227-0	243-4		32-8	51-0	51-3	51-6	51-0	51-4	52-2	53-1	54-4	50-0
61-6	61-7	61-2	60-3	59-1	58-0	56-6	55-2	54-0		258-6	271-5	284-0	296-6	309-3	321-8	334-4	346-7	359-2	11-6
146-4	158-7	171-1	183-5	195-8	208-3	220-9	233-4	246-1		194-9	195-4	195-9	196-3	196-2	196-1	196-0	195-4	194-8	194-3
185-5	186-7	187-9	189-1	190-2	191-3	192-4	193-2	194-0											
									1955	332-3	339-5	346-6	353-6	0-7	7-6	14-4	21-3	28-2	35-1
271-5	277-7	284-0	290-7	297-5	304-3	311-2	318-2	325-4		274-6	289-7	300-6	304-5	298-6	293-1	297-3	308-5	324-6	342-2
198-2	197-9	189-4	187-6	194-7	207-2	223-0	240-3	257-7		91-0	89-7	88-4	87-1	86-0	85-3	84-8	84-0	84-9	85-4
93-5	94-4	95-1	95-4	95-4	95-0	94-3													

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn. for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of I.S.V.		0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1975	Mars	Eng. Ap 14	Ap 24	My 4	My 14	My 24	Je 3	Je 13	Je 23	Je 3	Je 13	Je 23	Au 2	Au 12	Au 22	S 1	S 11	S 21	O 1
	Mercury	.. 306.8	314.4	322.0	329.4	337.0	344.5	351.8	359.1	6.0	13.1	19.7	26.4	32.8	38.7	44.5	49.7	54.6	59.0
	Jupiter	.. 356.2	15.0	32.6	48.0	58.4	60.4	53.6	50.4	57.2	70.6	87.2	105.2	123.5	141.4	157.7	171.1	178.4	176.1
	Venus	.. 341.6	343.9	346.2	348.5	350.6	352.5	354.3	356.0	357.3	358.4	359.3	359.7	359.9	359.7	359.1	358.2	357.0	355.8
	Saturn	.. 36.6	48.2	59.7	71.1	82.2	93.0	103.2	112.9	121.7	129.6	134.9	138.0	137.4	132.5	126.2	121.8	121.2	124.4
1976	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 2	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 78.6	83.7	89.1	94.7	100.3	105.9	111.8	117.8	123.6	129.9	136.0	142.0	148.5	154.7	161.1	167.7	174.2	180.8
	Jupiter	.. 10.3	26.2	37.8	41.6	35.9	30.9	35.8	48.7	64.8	82.8	101.4	119.8	136.8	150.3	160.7	161.2	153.7	151.7
	Venus	.. 9.1	11.5	13.9	16.3	18.6	21.0	23.3	25.5	27.5	29.5	31.2	32.7	34.1	35.1	35.7	36.0	36.2	36.8
	Saturn	.. 342.4	354.8	7.2	18.3	31.8	43.9	56.3	68.5	80.7	93.1	105.2	117.5	129.7	142.0	154.2	166.6	178.8	191.1
1977	Mars	.. 324.6	332.4	340.2	347.5	355.3	2.8	10.4	17.7	24.9	31.9	38.8	45.7	52.5	59.0	65.2	71.3	77.3	82.8
	Mercury	.. 16.7	22.7	18.2	11.9	14.5	26.4	42.1	60.1	78.9	97.5	115.2	130.8	142.1	144.9	139.1	133.5	137.9	149.9
	Jupiter	.. 36.6	38.7	41.1	43.3	45.7	48.1	50.5	52.8	55.1	57.4	59.6	61.6	63.7	65.5	67.0	68.6	69.6	70.4
	Venus	.. 349.1	345.3	345.5	348.9	355.4	3.0	12.1	21.7	32.0	42.7	54.0	65.2	76.6	88.3	100.1	111.9	123.9	136.2
	Saturn	.. 107.6	107.8	108.0	108.3	109.1	109.9	110.6	111.7	112.8	114.8	115.3	116.6	117.8	119.1	120.4	121.8	122.9	124.0
1978	Mars	.. 97.8	101.2	105.5	110.3	115.1	120.3	125.8	131.2	137.2	143.0	148.9	155.2	161.4	167.7	174.1	180.6	187.5	194.1
	Mercury	.. 0.5	353.3	354.6	4.6	19.8	37.4	53.3	74.3	92.2	109.7	121.1	127.0	123.0	116.5	119.2	129.8	144.8	161.6
	Jupiter	.. 64.7	66.3	68.1	70.0	72.1	74.2	76.5	78.7	81.1	83.4	85.6	88.0	90.2	92.3	94.4	96.4	98.2	99.8
	Venus	.. 19.9	32.2	44.4	56.5	68.6	80.4	92.2	104.0	115.6	127.2	138.5	149.6	160.2	170.8	180.7	189.7	197.8	204.0
	Saturn	.. 121.5	121.4	121.3	121.9	122.5	123.0	123.9	124.8	125.8	127.0	128.2	129.5	130.8	132.1	133.3	134.5	135.7	
1979	Mars	Eng. Ap 14	Ap 24	My 4	My 14	My 24	Je 3	Je 13	Je 23	Je 3	Je 13	Je 23	Au 2	Au 12	Au 22	S 1	S 11	S 21	O 1
	Mercury	.. 341.4	349.3	356.8	4.5	12.0	19.3	26.6	33.9	41.2	48.2	54.9	61.8	68.4	75.1	81.5	87.7	94.0	100.0
	Jupiter	.. 335.5	352.1	357.3	14.8	33.4	52.5	71.0	88.0	101.5	109.1	106.8	99.6	100.0	109.4	123.8	140.5	158.3	175.9
	Venus	.. 94.3	95.0	95.9	97.2	98.8	100.4	102.3	104.4	106.4	108.5	110.8	113.0	115.2	117.4	119.7	121.9	123.9	126.1
	Saturn	.. 325.2	337.5	349.5	1.7	13.7	26.0	38.2	50.4	62.4	74.8	86.8	99.2	111.4	123.7	136.0	148.3	160.7	173.1
1980	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 2	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 122.8	124.0	126.3	129.3	133.0	137.1	141.9	146.8	152.2	157.8	163.7	169.5	175.7	181.9	188.5	195.0	201.7	208.6
	Jupiter	.. 125.6	125.3	125.3	125.6	126.3	127.1	128.4	129.8	131.4	133.1	135.1	137.1	139.2	141.4	143.5	145.7	148.0	150.2
	Venus	.. 45.5	54.5	61.9	67.4	70.0	68.5	63.9	57.5	53.1	52.7	56.0	62.0	69.8	79.0	88.6	99.0	109.9	120.6
	Saturn	.. 149.0	148.5	148.0	147.5	147.5	147.6	147.6	148.2	148.8	149.3	150.3	151.2	152.2	153.4	154.6	155.8	157.1	158.4
1981	Mars	.. 357.3	4.7	12.4	19.7	27.0	34.3	41.5	48.5	55.5	62.3	69.3	76.0	82.6	89.7	95.5	101.8	108.0	114.1
	Mercury	.. 347.8	6.4	25.3	43.1	58.8	69.7	71.7	65.2	61.3	67.9	80.9	97.1	115.0	133.3	151.1	166.4	180.6	187.7
	Jupiter	.. 168.8	157.7	156.8	156.1	155.7	155.7	155.9	156.6	157.4	158.6	159.9	161.5	163.3	165.1	167.1	169.2	171.4	173.5
	Venus	.. 1.7	13.8	26.4	38.6	51.2	63.3	75.4	87.5	99.6	111.7	123.8	135.8	147.6	159.8	171.5	183.3	195.0	206.6
	Saturn	.. 162.4	161.7	161.0	160.4	160.2	160.0	159.8	160.1	160.4	160.8	161.6	162.4	163.2	164.3	165.4	166.5	167.7	168.9
1982	Mars	.. 160.0	157.3	156.1	156.6	157.4	159.9	162.9	166.8	171.0	175.8	181.1	186.5	192.4	198.7	204.8	211.2	218.0	224.9
	Mercury	.. 2.4	20.5	36.5	46.6	52.7	47.0	42.0	46.9	58.8	74.8	92.8	111.3	129.5	146.4	161.0	170.3	180.6	163.7
	Jupiter	.. 192.9	191.6	190.4	189.0	187.8	186.9	186.2	185.8	185.8	186.0	186.6	187.5	188.6	189.9	191.4	193.2	195.1	197.1
	Venus	.. 313.6	324.0	335.3	346.6	358.1	9.6	21.5	33.2	45.0	56.9	69.0	81.0	93.2	105.4	117.6	129.7	142.2	154.4
	Saturn	.. 175.4	174.7	174.0	173.2	172.8	172.4	172.0	172.1	172.2	172.2	172.8	173.4	174.1	175.0	176.0	177.0	178.2	179.4
1983	Mars	Eng. Ap 14	Ap 24	My 4	My 14	My 24	Je 3	Je 13	Je 23	Je 3	Je 13	Je 23	Au 2	Au 12	Au 22	S 1	S 11	S 21	O 1
	Mercury	.. 12.4	19.8	26.9	34.2	42.3	48.4	55.4	62.0	69.0	75.7	82.3	89.1	95.4	102.1	108.4	114.6	121.1	127.3
	Jupiter	.. 14.5	27.5	33.3	39.3	23.0	25.7	37.0	52.6	70.5	89.2	107.7	125.3	140.6	151.6	154.6	148.5	143.2	147.9
	Venus	.. 226.6	225.9	224.9	223.7	222.4	221.0	219.7	218.5	217.7	216.9	216.4	216.4	216.7	217.3	218.2	219.3	220.7	222.3
	Saturn	.. 37.1	48.7	60.2	71.5	82.5	93.2	103.2	112.6	121.2	128.3	133.5	135.9	134.2	128.6	123.8	119.2	119.4	123.2
1984	Mars	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 2	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
	Mercury	.. 213.6	212.0	209.7	206.3	203.0	200.6	199.3	199.7	200.7	203.5	206.5	210.6	215.2	220.3	226.0	231.7	238.2	244.7
	Jupiter	.. 13.7	11.8	4.6	5.0	15.1	30.2	47.9	66.6	85.4	103.6	119.7	132.4	137.7	133.5	126.8	128.7	139.7	154.1
	Venus	.. 258.8	259.1	259.1	258.8	258.2	257.2	256.0	254.8	253.5	252.1	250.9	249.8	249.0	248.5	248.4	248.6	249.1	250.0
	Saturn	.. 343.1	355.4	7.8	20.2	32.4	44.8	56.9	69.3	81.5	93.7	105.9	118.1	130.4	142.6	154.9	167.2	179.5	191.7
1985	Mars	.. 200.5	199.7	198.9	198.2	197.5	196.8	196.2	195.9	195.6	195.2	195.4	195.6	195.9	196.6	197.3	198.0	199.0	200.0
	Mercury	.. 27.2	34.1	41.0	48.1	54.8	61.6	68.4	75.1	81.5	88.2	94.9	101.3	107.7	114.2	120.6	127.0	133.2	139.6
	Jupiter	.. 347.1	345.1	352.9	7.5	24.9	43.4	62.6	80.9	98.2	112.0	119.6	117.7	110.1	109.7	119.3	133.3	150.0	167.7
	Venus	.. 288.8	290.2	291.3	292.3	292.8	292.9	292.8	292.3	291.6	290.5	289.2	287.8	286.4	285.2	284.1	283.1	282.6	282.2
	Saturn	.. 345.5	342.4	343.5	347.9	354.5	2.6	11.9	21.7	32.1	43.0	54.3	65.6	77.1	88.7	100.4	112.5	124.5	136.6
1986	Mars	.. 212.6	211.9	211.2	210.4	209.6	208.8	208.1	207.7	207.3	206.8	206.8	206.8	207.7	208.2	207.7	208.2	209.1	210.0
	Mercury	.. 253.6	257.9	262.0	265.4	267.8	269.6	270.2	269.5	268.1	265.1	262.3	260.7	259.6	260.3	262.2	265.1	269.1	273.0
	Jupiter	.. 332.8	345.5	2.3	20.6	39.7	58.6	75.9	90.8	100.5	100.1	92.8	90.8	98.8	112.1	128.7	147.0	164.3	181.5
	Venus	.. 317.4	319.4	321.4	323.2	324.7	326.1	327.1	327.9	328.3	328.5	328.2	327.6	326.7	325.5	324.2	323.0	321.4	320.2
	Saturn	.. 20.6	32.8	45.0	57.1	69.1	81.1	92.8	104.5	116.0	127.6	138.7	149.8	160.6	170.8	180.6	189.3	196.9	203.7

Meek. Vrish. Mith. Kat. Sim. Kan. Tul. Vrsch. Dhan. Mrk. Kum. Min. Asv. Bhar. Krit. Rohi. Mrig. Ardh. Punar. Push. Asles.
30 60 90 120 150 180 210 240 270 300 330 360 133 267 400 533 667 800 933 1067 1209

P.G.—contd.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999 ;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
O 11	O 21	O 31	N 10	N 20	N 30	D 10	D 20	D 30	Ja 9	Ja 19	Ja 29	F 8	F 18	F 28	Mr 9	Mr 19	Mr 29	Ap 8
62-7	65-6	67-4	68-3	67-7	65-7	63-0	59-6	56-4	53-9	52-5	52-8	53-9	56-2	58-9	62-6	66-6	71-1	76-0
168-8	167-1	176-5	190-2	206-2	223-6	240-7	257-3	271-6	281-1	282-6	275-3	271-7	277-5	290-2	306-3	324-2	342-8	0-8
354-5	353-1	351-8	350-7	349-8	349-3	349-2	349-3	349-9	350-7	351-8	352-2	355-0	356-8	358-7	0-9	3-2	5-4	7-8
130-1	138-0	147-0	156-7	167-3	178-3	189-6	201-3	213-1	225-0	237-3	249-2	261-7	274-0	286-4	298-6	311-1	323-7	335-9
100-2	100-5	100-8	101-2	101-0	100-8	100-0	100-7	99-3	98-6	97-7	96-8	96-0	95-4	94-8	94-1	93-9	93-8	93-7
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
187-5	194-3	201-2	208-0	215-0	222-2	229-3	236-6	243-8	251-3	258-6	266-3	273-9	281-5	289-2	297-1	304-9	312-6	320-4
157-3	170-2	186-1	203-2	220-6	237-1	252-1	263-1	266-8	261-4	255-3	258-5	269-9	285-0	302-3	320-5	338-6	356-0	10-8
35-1	34-2	33-0	31-6	30-3	29-0	27-7	26-7	26-0	25-5	25-4	25-8	26-3	27-2	28-5	30-0	31-6	33-4	35-5
203-4	215-6	227-8	239-9	252-1	264-0	275-8	287-6	299-2	310-4	321-3	331-2	340-8	349-4	355-9	1-3	1-7	358-5	352-4
112-9	113-5	114-1	114-8	114-9	115-0	115-0	114-5	114-0	113-5	112-7	111-9	111-2	110-4	109-6	108-8	108-4	108-0	107-6
88-1	93-0	97-6	101-4	104-8	107-3	109-0	109-5	108-7	106-2	103-0	99-3	95-5	92-6	90-9	90-4	91-2	93-2	95-9
165-3	182-4	199-9	216-9	232-4	244-9	250-7	247-7	240-2	240-6	250-2	264-2	280-9	298-6	316-9	334-0	349-4	0-6	3-4
71-0	71-1	71-0	70-5	69-8	68-6	67-3	66-1	64-7	63-4	62-3	61-3	60-7	60-4	60-3	60-9	61-6	6-6	63-9
148-3	160-6	172-7	185-4	197-7	210-2	222-7	235-6	248-2	260-9	273-5	286-1	298-9	311-2	324-4	336-8	349-3	1-6	14-0
125-2	126-0	126-8	127-7	128-0	128-3	128-7	128-5	128-3	128-0	127-3	126-6	125-9	125-2	124-5	123-7	123-1	122-5	121-9
201-1	208-0	214-8	222-1	229-2	236-5	243-9	251-4	258-9	266-6	274-4	282-1	289-8	297-7	305-5	313-5	321-5	329-2	337-2
178-2	196-6	212-8	226-2	234-5	234-0	226-9	223-3	230-2	244-2	260-1	277-6	295-5	312-8	328-5	340-2	345-3	340-1	334-0
101-3	102-5	103-4	104-0	104-3	104-3	104-0	103-3	102-3	101-1	99-8	98-5	97-1	96-1	95-0	94-1	93-8	93-6	93-9
207-4	208-1	204-7	198-9	193-7	192-3	194-7	201-0	208-4	217-1	227-1	237-5	248-4	259-9	271-4	283-0	294-8	306-7	319-5
137-0	138-0	139-0	140-0	140-6	141-2	141-7	141-7	141-7	141-7	141-2	140-7	140-2	139-4	138-6	137-8	137-1	136-4	135-6
O 11	O 21	O 31	N 10	N 20	N 30	D 10	D 20	D 30	Ja 9	Ja 19	Ja 29	F 8	F 18	F 28	Mr 9	Mr 19	Mr 29	Ap 8
105-8	111-4	116-5	121-6	126-4	130-8	134-6	137-8	140-3	141-8	142-7	141-2	130-1	135-9	131-9	128-3	125-2	123-0	122-7
192-7	207-2	217-4	219-3	212-2	207-9	212-5	224-4	239-7	256-8	274-3	291-7	307-6	320-5	327-0	323-7	316-8	311-9	328-0
128-0	129-7	131-4	132-8	134-0	134-9	135-6	135-9	135-9	135-7	135-0	134-0	132-9	131-6	130-3	128-9	127-7	126-6	125-8
185-6	198-1	210-5	223-0	235-5	248-1	260-4	272-9	285-2	297-7	309-8	321-9	333-9	345-8	357-6	8-8	19-9	30-0	40-7
148-6	149-7	150-8	151-9	152-6	153-8	154-1	154-3	154-5	154-8	154-5	154-2	153-9	153-2	152-5	151-7	151-0	150-2	149-4
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
215-4	222-6	229-6	237-0	244-4	251-8	259-5	267-1	274-7	282-6	290-3	298-4	306-2	314-0	321-3	329-8	337-7	345-3	353-0
199-3	204-0	199-3	192-7	194-6	204-8	219-4	235-9	253-4	270-7	287-1	300-7	308-6	307-9	300-4	298-9	306-8	321-1	338-1
152-2	154-3	156-4	158-3	160-1	161-8	163-2	164-3	165-3	165-9	166-3	166-3	166-0	165-3	164-4	163-5	162-1	160-8	159-5
132-5	144-2	156-0	168-1	180-1	192-5	204-8	217-2	229-8	242-2	254-8	267-2	280-0	292-5	305-1	317-7	330-1	342-6	356-0
159-6	160-7	161-8	163-0	163-9	164-8	165-7	166-1	166-5	167-1	166-9	166-9	166-8	166-2	165-6	165-1	164-3	163-6	162-7
120-2	126-1	131-8	137-5	142-9	148-5	153-2	158-0	162-3	166-4	169-7	172-3	174-3	174-8	174-6	172-4	169-2	165-4	161-6
185-7	178-0	177-0	185-8	199-4	215-5	232-8	250-2	266-5	281-1	291-0	291-0	285-3	281-1	287-4	300-0	316-1	334-0	352-8
175-7	177-9	180-1	182-2	184-3	186-4	188-3	190-0	191-7	193-1	194-3	195-3	195-9	196-3	196-5	196-1	195-5	194-5	193-5
218-0	229-2	240-1	250-3	260-0	268-9	276-3	281-8	284-2	283-0	278-1	272-8	268-7	269-8	273-6	288-4	288-6	298-0	307-9
170-2	171-4	172-6	173-8	174-8	175-8	176-8	177-4	178-0	178-7	178-9	179-1	179-2	178-8	178-4	178-1	177-3	176-5	173-8
232-0	239-0	246-3	253-6	261-0	268-6	276-3	283-9	291-6	299-4	307-3	315-0	322-8	330-5	338-2	346-0	353-5	0-9	8-4
160-0	167-0	179-3	195-1	212-2	229-6	246-2	261-3	272-6	276-1	270-2	264-7	257-3	279-0	294-6	311-9	330-3	348-7	5-8
199-2	201-4	203-6	205-8	208-0	210-2	212-4	214-6	216-6	218-5	220-3	222-0	223-6	224-9	225-8	226-6	226-9	227-1	226-9
167-0	179-4	191-9	204-5	216-9	229-5	242-2	254-8	267-4	280-5	292-7	305-2	317-6	330-0	342-3	354-6	6-7	18-8	31-0
180-5	181-4	182-9	184-2	185-3	186-4	187-5	188-3	189-1	189-9	190-8	190-5	190-7	190-7	190-5	190-4	189-8	189-2	188-6
O 11	O 21	O 31	N 10	N 20	N 30	D 10	D 20	D 30	Ja 9	Ja 19	Ja 29	F 8	F 18	F 28	Mr 9	Mr 19	Mr 29	Ap 8
133-5	139-4	145-5	151-5	157-2	163-0	168-6	174-2	179-7	185-0	190-1	194-8	199-4	203-5	207-0	210-1	212-4	213-8	214-2
159-4	174-7	191-8	209-2	226-2	241-7	253-9	269-9	286-5	249-3	250-1	250-5	253-7	290-8	308-6	326-9	344-2	359-7	11-0
224-1	226-0	228-0	230-1	232-4	234-5	236-9	239-1	241-4	243-5	243-8	247-9	249-9	251-9	253-6	255-2	256-6	257-7	258-4
129-5	137-5	147-0	156-9	167-5	178-6	190-1	201-7	213-5	225-4	237-6	249-7	262-2	274-6	286-9	299-2	311-7	324-1	336-5
190-8	192-0	193-2	194-4	195-5	196-6	197-8	198-7	199-3	200-6	201-1	201-6	202-2	202-2	202-2	202-3	201-8	201-3	200-8
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29	Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
251-5	258-4	265-5	272-7	280-0	287-3	294-8	302-3	309-9	317-4	324-8	332-5	340-7	347-2	354-7	1-8	4-3	16-3	23-4
171-0	188-5	205-9	222-0	235-5	243-3	242-7	235-2	232-7	239-8	253-5	269-6	287-2	305-5	322-8	338-5	350-8	355-5	351-1
261-1	252-4	254-1	255-8	257-8	259-8	262-0	264-3	266-5	268-9	271-1	273-4	275-8	278-1	280-3	282-4	284-4	286-3	288-0
203-8	216-0	228-3	240-3	252-5	264-5	276-2	288-1	299-4	310-6	321-1	331-4	340-6	348-6	354-9	358-4	358-7	354-7	348-4
201-0	202-2	203-4	204-5	205-7	206-9	208-0	209-0	210-0	211-0	211-7	212-4	213-2	213-2	213-6	213-6	213-5	213-2	212-9
145-7	152-0	158-2	164-3	170-6	176-7	182-8	188-2	194-9	201-2	206-9	212-8	218-7	224-5	230-2	235-8	241-1	246-2	251-9
185-3	202-0	216-3	226-4	228-3	221-7	216-8	221-7	233-4	248-8	266-0	284-4	301-2	317-4	330-3	337-1	334-6	327-4	327-7
282-3	282-7	283-5	284-4	285-8	287-3	289-1	290-9	293-0	295-2	297-4	299-0	302-2	304-5	306-9	309-3	311-7	313-9	316-3
148-8	161-1	173-3	185-9	198-4	210-8	223-3	235-8	248-8	261-3	273-9	286-5	299-4	311-8	324-4	336-8	349-3	1-6	14-0
210-9	212-0	213-1	214-3	215-5	216-7	217-8	218-9	220-0	221-1	222-0	222-9	223-7	224-1	224-5	224-8	225-0	225-2	224-5
278-8	284-4	290-4	296-8	303-2	309-9	316-4	323-0	330-0	336-8	343-8	350-7	357-6	4-4	11-3	17-9	24-8	31-4	38-2
196-9	208-7	213-0	208-1	201-9	203-4	213-8	228-4	245-1	262-8	280-0	296-6	310-3	318-9	317-9	310-6	308-7	317-4	331-0
819-2	318-3	317-8	317-6	318-0	318-4													

P.G.—Geocentric Places of Mars, Mercury, Jupiter, Venus and Saturn for every tenth
For longitude of MOON use Nakshatra Table, p. 36, or the method at p. 7. For mean

Day of L.S.Y.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1987	Eng. Ap 14	Ap 24	My 4	My 14	My 24	Je 3	Je 13	Je 23	Je 3	Je 13	Je 23	Au 2	Au 12	Au 22	S 1	S 11	S 21	O 1
Mars	41.7	48.3	54.9	61.5	68.1	74.6	81.1	87.6	94.0	100.4	106.8	113.2	119.7	126.1	132.4	138.8	145.2	151.5
Mercury	339.9	358.0	16.7	35.5	53.5	69.1	80.2	82.4	76.0	72.1	78.0	90.8	107.2	124.9	143.1	160.6	176.9	189.9
Jupiter	345.3	347.7	350.0	352.3	354.4	356.6	358.5	0.2	1.7	2.9	3.9	4.7	4.9	4.9	4.5	3.8	2.8	1.4
Venus	325.7	337.8	350.0	2.2	14.2	26.5	38.8	50.9	63.0	75.3	87.4	99.7	111.9	124.2	136.5	149.0	161.2	173.7
Saturn	235.7	235.5	235.3	234.2	233.4	232.6	231.9	231.2	230.5	229.7	229.3	228.9	228.6	228.0	227.0	225.9	224.7	230.3
1988	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 2	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
Mars	279.2	286.0	292.3	298.8	305.2	311.2	317.1	322.8	328.1	332.8	337.1	340.2	342.4	343.2	342.8	340.7	338.0	335.7
Mercury	354.2	12.5	30.9	47.1	59.4	63.9	58.8	52.9	57.1	69.3	85.1	103.0	121.4	139.6	156.3	170.7	179.6	180.2
Jupiter	12.8	15.2	17.6	20.1	22.5	24.8	27.1	29.4	31.5	33.4	35.2	36.9	38.3	39.5	40.4	40.8	41.1	41.0
Venus	45.5	54.2	61.3	66.0	67.8	66.1	60.1	53.8	50.4	51.0	55.0	61.2	69.5	78.8	88.8	99.3	110.3	121.5
Saturn	246.9	246.6	246.3	245.9	245.3	244.7	244.0	243.2	242.4	241.7	241.1	240.5	240.0	239.9	239.8	239.8	240.2	240.6
1989	Mars	50.6	62.6	69.0	75.0	81.1	87.5	93.8	100.0	106.2	112.5	118.9	125.1	131.5	137.8	144.1	150.4	156.9
Mercury	36.3	25.0	38.3	45.5	41.1	34.3	33.8	47.4	62.8	80.8	99.6	117.6	135.3	153.5	161.1	164.4	158.6	153.1
Jupiter	40.4	42.5	44.7	47.0	49.3	51.7	54.1	56.4	58.7	61.0	63.3	65.4	67.4	69.3	71.1	72.5	73.8	74.7
Venus	2.1	14.7	27.0	39.3	51.5	63.9	76.0	85.1	100.1	112.2	124.3	136.2	148.3	160.1	172.0	183.7	195.4	207.0
Saturn	257.9	257.8	257.6	257.5	256.9	256.3	255.7	254.9	254.1	253.3	252.7	252.1	251.4	251.0	250.7	250.7	251.0	251.3
1990	Mars	299.3	306.8	314.3	321.3	329.2	336.2	343.7	350.6	357.6	4.3	10.6	17.1	22.8	28.6	33.7	38.0	42.0
Mercury	16.7	24.6	28.8	15.6	16.0	25.7	40.4	58.2	76.8	95.2	113.3	129.5	142.4	147.4	143.2	136.6	138.8	148.7
Jupiter	68.6	70.0	71.8	73.7	75.7	77.8	80.0	82.2	84.5	86.9	89.1	91.3	93.6	95.8	97.9	99.9	101.9	103.6
Venus	313.8	324.3	335.5	347.0	358.6	10.2	22.1	33.7	45.6	57.5	69.6	81.6	93.8	106.0	118.1	130.4	142.7	155.1
Saturn	268.9	269.0	269.1	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7	268.7
1991	Eng. Ap 14	Ap 24	My 4	My 14	My 24	Je 3	Je 13	Je 23	Je 3	Je 13	Je 23	Au 2	Au 12	Au 22	S 1	S 11	S 21	O 1
Mars	71.9	77.6	83.1	88.9	94.7	100.6	106.6	112.5	118.7	124.8	130.9	137.3	143.7	150.0	156.2	162.7	169.4	175.8
Mercury	5.3	357.7	355.9	3.9	18.1	35.3	53.9	73.0	91.5	108.3	122.0	129.6	127.7	120.2	128.7	143.1	159.8	169.8
Jupiter	98.4	99.0	99.9	101.0	102.4	104.1	105.9	107.7	109.8	111.9	114.0	116.2	118.6	120.8	123.0	125.2	127.3	129.4
Venus	37.5	49.1	60.6	71.9	82.7	93.3	103.4	112.6	120.7	127.6	132.4	135.7	131.0	125.3	119.3	116.5	117.7	122.2
Saturn	279.7	280.0	280.3	280.5	280.2	279.9	279.7	279.0	278.3	277.6	276.8	276.0	275.3	274.7	274.1	273.5	273.4	273.3
1992	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 2	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
Mars	317.8	325.4	333.3	340.7	348.5	355.9	3.5	10.7	18.8	26.1	32.1	39.0	45.4	51.9	58.0	64.0	69.7	74.8
Mercury	336.6	342.5	355.8	12.5	30.9	50.1	68.9	86.4	101.2	110.7	111.4	104.0	101.2	108.4	122.2	138.4	156.1	173.8
Jupiter	130.0	129.6	129.5	129.6	130.1	130.9	132.0	133.3	134.9	136.6	138.4	140.5	142.5	144.6	146.7	148.7	151.2	153.3
Venus	343.5	355.8	8.3	20.4	32.9	45.3	57.5	69.8	82.1	94.2	106.8	118.6	130.9	143.1	155.4	167.5	180.0	192.3
Saturn	290.6	291.0	291.4	291.9	291.8	291.7	291.2	290.7	290.2	289.4	288.6	287.7	287.0	286.3	285.7	285.4	285.1	285.1
1993	Mars	89.7	94.0	98.7	103.8	109.1	114.6	120.1	125.9	131.7	137.7	143.8	149.8	156.4	162.9	169.5	175.5	181.9
Mercury	334.3	350.0	8.1	26.9	48.1	63.8	79.6	91.0	93.5	87.0	82.7	88.7	100.9	117.0	134.5	152.6	170.3	186.4
Jupiter	163.6	162.3	161.2	160.4	160.0	159.8	159.4	160.4	161.1	162.1	163.4	164.9	166.6	168.4	170.4	172.6	174.5	176.7
Venus	342.0	340.0	341.9	346.9	354.1	2.6	11.9	21.9	32.5	43.3	54.5	66.0	77.5	89.3	101.0	113.0	125.1	137.0
Saturn	304.1	302.0	302.6	303.3	303.5	303.7	303.9	303.5	303.1	302.8	302.1	301.4	300.6	299.8	299.0	298.2	297.7	297.2
1994	Mars	334.9	342.6	350.4	358.0	5.6	13.0	20.6	27.6	35.1	42.0	49.0	55.7	62.5	69.1	75.5	81.7	87.9
Mercury	345.5	4.0	22.8	41.2	57.6	70.3	75.0	69.7	63.9	68.3	79.3	95.1	112.7	131.0	148.9	165.9	180.1	189.2
Jupiter	197.7	196.4	195.6	194.7	193.5	192.5	191.3	190.6	189.9	189.0	188.0	187.0	186.0	185.0	184.0	183.0	182.0	181.0
Venus	21.0	33.4	45.5	57.5	69.6	81.4	93.3	105.0	116.6	127.9	139.1	149.1	160.6	170.8	180.4	188.9	196.2	201.4
Saturn	312.2	313.1	314.0	314.8	315.2	315.6	316.1	315.9	315.7	315.6	315.0	314.4	313.8	313.0	312.0	311.4	310.7	310.0
1995	Eng. Ap 14	Ap 24	My 4	My 14	My 24	Je 3	Je 13	Je 23	Je 3	Je 13	Je 23	Au 2	Au 12	Au 22	S 1	S 11	S 21	O 1
Mars	112.0	114.2	117.4	121.4	125.6	130.3	135.1	140.5	146.0	151.8	157.7	163.6	169.8	176.2	182.5	188.9	195.9	202.7
Mercury	0.4	18.7	35.4	48.9	55.5	52.2	45.5	47.3	58.0	73.3	90.7	109.4	127.5	144.9	160.2	171.1	174.1	167.7
Jupiter	231.2	230.5	229.7	228.6	227.3	225.9	224.6	223.4	222.2	221.5	220.9	220.7	220.9	221.2	221.0	220.8	220.4	220.9
Venus	326.2	338.2	350.3	2.4	14.7	26.9	39.2	51.3	63.4	75.7	87.8	100.2	112.5	124.7	137.1	149.3	161.6	174.3
Saturn	323.4	324.4	325.4	326.5	327.1	327.7	328.3	328.4	328.5	328.5	328.1	327.7	327.2	326.7	326.2	325.6	324.0	323.2
1996	Eng. Ap 13	Ap 23	My 3	My 13	My 23	Je 2	Je 12	Je 22	Je 2	Je 12	Je 22	Au 1	Au 11	Au 21	Au 31	S 10	S 20	S 30
Mars	351.1	358.8	6.2	13.9	21.2	28.6	35.8	43.1	49.9	57.1	63.7	70.5	77.1	83.7	90.2	96.5	102.7	108.7
Mercury	13.2	27.4	35.3	34.4	29.9	26.6	35.8	50.8	68.4	87.1	105.4	123.5	139.8	152.1	157.3	153.5	146.5	147.9
Jupiter	263.0	263.5	263.7	263.5	263.0	262.3	261.2	259.9	258.6	257.3	256.0	254.8	253.9	253.3	253.0	253.1	253.4	254.1
Venus	45.3	53.8	60.2	64.6	65.3	62.5	56.3	50.7	48.0	49.3	53.9	61.0	69.5	78.8	89.0	99.7	110.5	121.8
Saturn	334.7	335.8	336.9	338.1	338.9	339.7	340.6	340.9	341.2	341.6	341.4	341.2	340.9	340.2	339.5	338.9	338.1	337.3
1997	Mars	143.5	142.5	142.7	144.4	146.9	150.0	153.7	158.1	162.9	168.3	173.8	179.5	185.5	191.8	198.2	204.6	211.3
Mercury	14.9	16.1	9.0	6.4	14.8	28.4	45.6	64.0	83.1	101.4	118.3	132.0	139.7	137.7	131.9	130.0	138.9	152.3
Jupiter	292.8	294.4	295.6	296.5	297.4	297.7	297.5	296.8	295.8	294.7	293.3	291.9	290.6	289.4	288.3	287.4	287.2	287.2
Venus	2.8	15.2	27.5	39.8	52.1	64.2	76.7	88.5	100.7	112.6	124.8	136.7	148.8	160.6	172.4	184.3	196.9	207.2
Saturn	346.1	347.3	348.5	349.8	350.9	351.9	352.9	353.5	354.1	354.7	354.7	354.8	354.8	354.4	354.0	353.3	352.5	351.7
1998	Mars	6.4	13.9	21.2	28.5	35.8	43.0	50.0	56.9	63.9	70.5	77.3	84.0	90.4	96.9	103.5	109.9	116.1
Mercury	351.6	347.5	353.5	6.0	22.8	41.3	60.3	79.0	96.4	111.7	121.3	121.3	114.3	111.5	119.0	131.6	148.1	162.2
Jupiter	321.2	323.3	325.3	327.3	328.9	330.4	331.8	332.5	333.1	333.3	333.4	333.9	332.1	331.2	329.9	328.6	327.1	325.8
Venus	314.0	324.5	335.9	347.3	359.1	10.7	22.5	34.3	46.2	58.2	70.0	82.2	94.2	106.5	118.6	131.2	143.3	155.7
Saturn	357.7	359.0	0.3	1.6	2.8	4.0	5.1	5.9	6.7	7.6</								

P.G.—contd.

completed day of the Indian Solar year from A.D. 1839—A.D. 1999;
and actual longitude of SUN for every completed day of Solar year see p. 47.

180	190	200	210	220	230	240	250	260		270	280	290	300	310	320	330	340	350	360
O 11	O 21	O 31	N 10	N 20	N 30	D 10	D 20	D 30		Ja 9	Ja 19	Ja 29	F 8	F 18	F 28	Mr 9	Mr 19	Mr 29	Ap 8
157-9	161-3	170-6	177-2	183-6	190-1	196-4	202-9	209-5	1988	215-9	222-6	229-1	235-7	242-3	249-6	255-8	262-3	269-0	275-8
196-7	194-6	186-9	186-5	194-8	208-4	224-7	241-7	259-5		276-0	290-5	300-2	301-8	294-8	291-1	296-8	309-7	326-1	344-1
0-2	358-8	357-5	356-2	355-2	354-6	354-2	354-2	354-6		355-2	356-3	357-5	359-0	0-8	2-8	4-8	6-9	9-3	11-6
186-1	198-7	211-0	223-5	236-0	248-6	260-9	273-4	285-8		298-0	310-4	322-4	334-3	346-1	357-9	0-1	20-0	30-6	40-7
230-9	231-9	232-9	233-9	235-1	236-3	237-4	238-5	239-6		240-8	241-8	242-8	243-9	244-6	245-3	246-1	246-4	246-7	246-9
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
333-6	333-3	333-7	335-5	338-3	341-8	345-8	350-3	355-2	1989	0-3	5-8	11-4	17-0	23-0	28-8	34-9	40-9	47-0	53-2
172-8	169-4	175-8	188-6	204-4	221-4	238-7	255-7	270-7		281-7	285-5	280-3	274-1	277-6	289-0	304-4	322-1	340-4	358-8
40-4	39-6	38-5	37-3	35-8	34-4	33-2	32-1	31-1		30-6	30-3	30-4	30-8	31-7	32-7	34-0	35-6	37-4	39-2
133-0	144-8	156-7	168-6	180-8	193-0	205-2	217-8	230-3		242-8	255-4	267-0	280-6	293-2	305-7	318-3	330-7	343-2	355-6
241-0	241-9	242-8	243-7	244-8	245-9	247-0	248-2	249-4		250-5	251-6	252-7	253-8	254-7	255-6	256-4	256-9	257-3	257-8
169-9	176-5	183-2	189-8	196-3	203-2	209-8	216-7	223-6	1990	230-5	237-6	244-5	251-8	258-9	266-1	273-5	280-8	288-1	295-4
157-5	168-8	184-1	201-0	218-3	235-4	250-8	263-4	270-6		266-1	258-6	259-4	268-9	283-2	300-3	318-4	336-8	354-3	10-2
75-5	75-8	75-9	75-5	74-8	73-9	72-8	71-4	70-2		68-7	67-4	66-3	65-7	65-3	65-1	65-4	65-9	66-7	67-9
218-3	229-4	240-1	250-4	259-8	268-2	275-0	280-4	281-6		279-5	273-5	268-5	266-1	267-6	272-6	279-8	288-5	298-0	308-0
251-5	252-2	252-9	253-7	254-7	255-7	256-7	257-9	259-1		260-3	261-5	262-7	263-8	264-7	265-6	266-7	267-3	267-9	268-6
47-1	47-8	47-5	46-2	43-2	40-0	37-1	35-3	34-4	1991	34-7	36-3	38-5	41-6	45-2	49-4	53-9	58-7	63-9	69-1
163-6	180-2	197-6	215-0	231-0	244-4	252-6	252-0	243-7		241-8	249-6	262-5	278-8	296-5	314-7	332-3	348-5	1-2	6-4
105-1	106-5	107-4	108-2	108-7	108-8	108-6	108-0	107-2		106-1	104-8	103-5	102-2	100-9	99-8	98-9	98-3	98-0	98-2
167-6	180-0	192-5	205-1	217-6	230-1	242-9	255-5	268-1		280-7	293-3	305-7	318-2	330-6	342-9	355-2	7-2	19-3	31-4
262-2	262-8	263-4	263-9	264-8	265-7	266-7	267-9	269-1		270-2	271-4	272-6	273-7	274-8	275-9	277-0	277-8	278-6	279-5
O 11	O 21	O 31	N 10	N 20	N 30	D 10	D 20	D 30		Ja 9	Ja 19	Ja 29	F 8	F 18	F 28	Mr 9	Mr 19	Mr 29	Ap 8
182-4	189-1	195-8	202-9	209-7	216-7	223-7	230-8	238-0	1992	245-4	252-7	260-2	267-6	275-8	282-7	290-6	298-2	305-9	313-7
177-2	194-5	211-1	225-5	235-5	237-0	230-2	225-7	230-6		242-7	258-3	275-6	293-4	310-8	327-1	340-4	347-5	344-0	337-6
131-5	133-3	134-9	136-4	137-8	138-8	139-5	140-1	140-2		140-0	139-6	138-7	137-6	136-4	135-1	133-7	132-4	131-4	130-4
120-0	137-4	146-9	157-0	168-0	178-8	189-3	200-2	213-9		225-9	238-3	250-5	262-7	275-0	287-5	299-8	312-2	324-7	337-2
273-2	278-6	274-0	274-4	275-3	276-2	277-0	278-1	279-2		280-3	281-5	282-7	283-9	285-1	286-3	287-4	288-3	289-2	290-1
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
79-6	84-0	87-8	91-2	93-3	94-6	94-8	93-4	91-0	1993	87-7	83-3	80-6	77-8	76-7	76-8	78-5	80-7	83-7	87-7
190-9	206-1	217-7	222-0	217-2	210-6	212-5	223-0	237-8		254-3	272-2	289-5	306-2	320-1	328-4	328-3	320-8	319-1	326-9
155-5	157-6	159-7	161-7	163-6	165-1	166-6	168-0	169-1		169-8	170-3	170-5	170-3	169-9	169-0	167-9	166-8	165-5	164-1
204-3	216-6	228-7	240-9	252-8	264-8	276-5	288-2	299-6		310-7	321-1	331-1	340-2	347-9	353-6	356-4	355-7	351-0	344-5
284-7	284-9	285-1	285-3	286-0	286-7	287-4	288-4	289-4		290-5	291-7	292-9	294-1	295-3	296-5	297-7	298-8	299-9	300-9
195-6	202-5	209-5	216-5	223-7	230-8	238-0	245-4	252-9	1994	260-6	268-2	275-8	283-7	291-3	299-4	307-0	314-8	322-8	330-8
199-3	206-0	203-6	196-1	195-3	204-2	217-5	233-7	251-2		268-8	285-4	300-2	310-0	311-6	305-2	300-7	307-2	319-7	336-0
178-9	181-3	183-3	185-5	187-5	189-6	191-6	193-5	195-1		196-8	198-0	199-1	199-0	200-4	200-5	200-4	200-0	199-2	198-2
149-6	161-7	174-1	186-4	199-1	211-5	224-2	236-8	249-4		262-1	274-6	287-5	300-0	312-5	325-1	337-6	350-0	2-5	14-8
296-7	296-7	296-7	296-7	297-2	297-7	298-3	299-2	300-1		301-0	302-2	303-4	304-5	305-7	306-9	308-2	309-4	310-6	311-8
99-2	104-8	109-7	114-5	118-7	122-7	126-1	128-3	129-4	1995	129-7	128-8	126-3	123-4	120-2	115-4	112-5	110-6	110-3	111-0
189-3	181-9	178-9	186-1	197-4	213-6	230-2	247-1	264-7		280-1	291-5	295-2	289-3	283-7	287-6	298-3	314-1	331-7	350-7
202-5	204-7	206-8	209-0	211-2	213-5	215-6	217-8	219-9		222-0	223-8	225-7	227-2	228-6	229-6	230-6	231-1	231-4	231-4
203-4	202-2	196-8	191-0	187-4	188-0	192-4	199-1	207-1		216-9	227-2	237-9	249-1	260-5	272-1	283-9	295-9	307-9	319-9
309-3	309-1	308-9	308-6	308-9	309-2	309-6	310-4	311-2		311-9	313-0	314-1	315-3	316-5	317-7	319-0	320-2	321-4	322-7
O 11	O 21	O 31	N 10	N 20	N 30	D 10	D 20	D 30		Ja 9	Ja 19	Ja 29	F 8	F 18	F 28	Mr 9	Mr 19	Mr 29	Ap 9
209-7	216-6	223-8	231-0	238-2	245-9	253-2	260-9	268-5	1996	276-3	284-2	291-9	299-8	307-8	315-6	323-5	331-4	339-2	347-1
162-4	166-7	178-2	193-3	210-3	227-6	244-6	260-1	272-4		278-4	275-1	267-9	268-8	278-4	293-1	310-2	328-2	346-7	4-5
227-6	229-5	231-5	233-5	235-8	238-0	240-2	242-4	244-8		246-9	249-2	251-4	253-5	255-5	257-4	258-9	260-4	261-6	262-6
186-5	199-1	211-5	223-9	236-5	248-8	261-4	273-8	286-2		298-4	310-6	322-7	334-7	346-4	357-9	0-2	20-0	30-5	40-4
322-5	322-1	321-7	321-2	321-3	321-4	321-5	322-1	322-7		323-4	324-4	325-5	326-5	327-7	328-9	330-2	331-5	332-8	334-1
O 10	O 20	O 30	N 9	N 19	N 29	D 9	D 19	D 29		Ja 8	Ja 18	Ja 28	F 7	F 17	F 27	Mr 9	Mr 19	Mr 29	Ap 8
114-7	120-6	126-1	131-8	136-9	141-8	146-5	150-7	154-5	1997	157-6	160-1	161-4	161-6	160-6	158-6	154-4	150-5	146-9	144-4
158-6	172-9	189-7	206-9	224-3	240-4	253-8	261-5	260-8		253-2	251-1	258-3	272-3	288-6	306-5	324-7	342-6	358-6	11-5
255-1	256-4	257-8	259-5	261-5	263-5	265-5	267-8	270-0		272-3	274-7	277-0	279-3	281-6	284-0	286-1	288-2	290-2	292-0
133-4	145-2	157-1	169-1	181-3	193-7	205-9	218-5	231-0		243-5	256-1	268-7	281-0	293-8	306-4	318-9	331-4	343-8	356-3
336-4	338-3	335-2	334-6	334-4	334-2	334-1	334-5	334-9		335-4	336-3	337-2	338-0	339-2	340-4	341-6	342-9	344-2	345-4
225-3	232-3	239-6	246-8	254-4	261-9	269-5	277-1	285-1		292-8	299-6	308-5	316-3	324-0	331-8	339-6	347-3	354-0	2-4
164-7	184-0	203-8	220-3	234-5	244-6	246-0	239-0	234-7		240-1	254-9	267-5	284-8	302-8	320-7	336-9	350-6	357-6	365-6
287-0	287-2	287-8	288-7	289-9	291-3	293-0	294-8	298-5		299-0	301-2	303-5	305-8	308-2	310-6	312-9	315-4	317-8	320-0
218-5	229-6	240-0	250-2	259-4	267-5	274-0	278-2	279-0		275-5	270-1	264-5	263-6	266-0	271-8	279-2	288-2	297-8	308-2
350-0	350-1	349-3	348-5	348-1	347-7	347-4	347-6	347-8		347-9	348-6	349-3	350-1	351-1	352-2	353-2	354-5	355-8	357-0
128-4	134-3	140-3	146-1	151-8	157-6	162-8	168-3	173-4	1999	178-0	182-8	186-8	190-6	193-					

TABLE H.

Ghatikas and Palas (Naligals and Vinadis) as Fractions of a day.

N.B.—The same table will serve for minutes and seconds as fractions of an Hour or a Degree.

Ghatikas.					Ghatikas.					Ghatikas.					Palas.					Ghatikas.				
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	0	1	2	3	4
0000	0167	0333	0500	0667	0833	1000	1167	1333	1500	1667	1833	2000	2167	2333	2500	2667	2833	3000	3167	0000	0169	0336	0503	0669
0005	0172	0339	0505	0672	0839	1005	1172	1339	1505	1672	1839	2005	2172	2339	2505	2672	2839	3005	3172	0005	0172	0339	0505	0672
0010	0177	0342	0508	0675	0842	1008	1175	1342	1508	1675	1842	2008	2175	2342	2508	2675	2842	3008	3175	0010	0177	0342	0508	0675
0015	0182	0347	0511	0678	0847	1011	1178	1344	1511	1678	1844	2011	2178	2344	2511	2678	2844	3011	3178	0015	0182	0347	0511	0678
0020	0187	0352	0516	0683	0850	1014	1180	1347	1514	1683	1850	2014	2180	2347	2514	2680	2847	3014	3180	0020	0187	0352	0516	0683
0025	0192	0357	0521	0688	0853	1017	1183	1350	1517	1688	1853	2017	2183	2350	2517	2683	2850	3017	3183	0025	0192	0357	0521	0688
0030	0197	0362	0525	0692	0858	1022	1188	1355	1522	1692	1858	2022	2188	2355	2522	2688	2855	3022	3188	0030	0197	0362	0525	0692
0035	0202	0367	0530	0697	0863	1027	1193	1360	1527	1697	1863	2027	2193	2360	2527	2693	2860	3027	3193	0035	0202	0367	0530	0697
0040	0207	0372	0535	0702	0868	1032	1198	1365	1532	1702	1868	2032	2198	2365	2532	2698	2865	3032	3198	0040	0207	0372	0535	0702
0045	0212	0377	0540	0707	0873	1037	1203	1370	1537	1707	1873	2037	2203	2370	2537	2703	2870	3037	3203	0045	0212	0377	0540	0707
0050	0217	0382	0545	0712	0878	1042	1208	1375	1542	1712	1878	2042	2208	2375	2542	2708	2875	3042	3208	0050	0217	0382	0545	0712
0055	0222	0387	0550	0717	0883	1047	1213	1380	1547	1717	1883	2047	2213	2380	2547	2713	2880	3047	3213	0055	0222	0387	0550	0717
0060	0227	0392	0555	0722	0888	1052	1218	1385	1552	1722	1888	2052	2218	2385	2552	2718	2885	3052	3218	0060	0227	0392	0555	0722
0065	0232	0397	0560	0727	0893	1057	1223	1390	1557	1727	1893	2057	2223	2390	2557	2723	2890	3057	3223	0065	0232	0397	0560	0727
0070	0237	0402	0565	0732	0898	1062	1228	1395	1562	1732	1898	2062	2228	2395	2562	2728	2895	3062	3228	0070	0237	0402	0565	0732
0075	0242	0407	0570	0737	0903	1067	1233	1400	1567	1737	1903	2067	2233	2400	2567	2733	2900	3067	3233	0075	0242	0407	0570	0737
0080	0247	0412	0575	0742	0908	1072	1238	1405	1572	1742	1908	2072	2238	2405	2572	2738	2905	3072	3238	0080	0247	0412	0575	0742
0085	0252	0417	0580	0747	0913	1077	1243	1410	1577	1747	1913	2077	2243	2410	2577	2743	2910	3077	3243	0085	0252	0417	0580	0747
0090	0257	0422	0585	0752	0918	1082	1248	1415	1582	1752	1918	2082	2248	2415	2582	2748	2915	3082	3248	0090	0257	0422	0585	0752
0095	0262	0427	0590	0757	0923	1087	1253	1420	1587	1757	1923	2087	2253	2420	2587	2753	2920	3087	3253	0095	0262	0427	0590	0757
0100	0267	0432	0595	0762	0928	1092	1258	1425	1592	1762	1928	2092	2258	2425	2592	2758	2925	3092	3258	0100	0267	0432	0595	0762
0105	0272	0437	0600	0767	0933	1097	1263	1430	1597	1767	1933	2097	2263	2430	2597	2763	2930	3097	3263	0105	0272	0437	0600	0767
0110	0277	0442	0605	0772	0938	1102	1268	1435	1602	1772	1938	2102	2268	2435	2602	2768	2935	3102	3268	0110	0277	0442	0605	0772
0115	0282	0447	0610	0777	0943	1107	1273	1440	1607	1777	1943	2107	2273	2440	2607	2773	2940	3107	3273	0115	0282	0447	0610	0777
0120	0287	0452	0615	0782	0948	1112	1278	1445	1612	1782	1948	2112	2278	2445	2612	2778	2945	3112	3278	0120	0287	0452	0615	0782
0125	0292	0457	0620	0787	0953	1117	1283	1450	1617	1787	1953	2117	2283	2450	2617	2783	2950	3117	3283	0125	0292	0457	0620	0787
0130	0297	0462	0625	0792	0958	1122	1288	1455	1622	1792	1958	2122	2288	2455	2622	2788	2955	3122	3288	0130	0297	0462	0625	0792
0135	0302	0467	0630	0797	0963	1127	1293	1460	1627	1797	1963	2127	2293	2460	2627	2793	2960	3127	3293	0135	0302	0467	0630	0797
0140	0307	0472	0635	0802	0968	1132	1298	1465	1632	1802	1968	2132	2298	2465	2632	2798	2965	3132	3298	0140	0307	0472	0635	0802
0145	0312	0477	0640	0807	0973	1137	1303	1470	1637	1807	1973	2137	2303	2470	2637	2803	2970	3137	3303	0145	0312	0477	0640	0807
0150	0317	0482	0645	0812	0978	1142	1308	1475	1642	1812	1978	2142	2308	2475	2642	2808	2975	3142	3308	0150	0317	0482	0645	0812
0155	0322	0487	0650	0817	0983	1147	1313	1480	1647	1817	1983	2147	2313	2480	2647	2813	2980	3147	3313	0155	0322	0487	0650	0817
0160	0327	0492	0655	0822	0988	1152	1318	1485	1652	1822	1988	2152	2318	2485	2652	2818	2985	3152	3318	0160	0327	0492	0655	0822
0165	0332	0497	0660	0827	0993	1157	1323	1490	1657	1827	1993	2157	2323	2490	2657	2823	2990	3157	3323	0165	0332	0497	0660	0827
0170	0337	0502	0665	0832	0998	1162	1328	1495	1662	1832	1998	2162	2328	2495	2662	2828	2995	3162	3328	0170	0337	0502	0665	0832
0175	0342	0507	0670	0837	1003	1167	1333	1500	1667	1837	2003	2167	2333	2500	2667	2833	3000	3167	3333	0175	0342	0507	0670	0837
0180	0347	0512	0675	0842	1008	1172	1338	1505	1672	1842	2008	2172	2338	2505	2672	2838	3005	3172	3338	0180	0347	0512	0675	0842
0185	0352	0517	0680	0847	1013	1177	1343	1510	1677	1847	2013	2177	2343	2510	2677	2843	3010	3177	3343	0185	0352	0517	0680	0847
0190	0357	0522	0685	0852	1018	1182	1348	1515	1682	1852	2018	2182	2348	2515	2682	2848	3015	3182	3348	0190	0357	0522	0685	0852
0195	0362	0527	0690	0857	1023	1187	1353	1520	1687	1857	2023	2187	2353	2520	2687	2853	3020	3187	3353	0195	0362	0527	0690	0857
0200	0367	0532	0695	0862	1028	1192	1358	1525	1692	1862	2028	2192	2358	2525	2692	2858	3025	3192	3358	0200	0367	0532	0695	0862
0205	0372	0537	0700	0867	1033	1197	1363	1530	1697	1867	2033	2197	2363	2530	2697	2863	3030	3197	3363	0205	0372	0537	0700	0867
0210	0377	0542	0705	0872	1038	1202	1368	1535	1702	1872	2038	2202	2368	2535	2702	2868	3035	3202	3368	0210	0377	0542	0705	0872
0215	0382	0547	0710	0877	1043	1207	1373	1540	1707	1877	2043	2207	2373	2540	2707	2873	3040	3207	3373	0215	0382	0547	0710	0877
0220	0387	0552	0715	0882	1048	1212	1378	1545	1712	1882	2048	2212	2378	2545	2712	2878	3045	3212	3378	0220	0387	0552	0715	0882
0225	0392	0557	0720	0887	1053	1217	1383	1550	1717	1887	2053	2217	2383	2550	2717	2883	3050	3217	3383	0225	0392	0557	0720	0887
0230	0397	0562	0725	0892	1058	1222	1388	1555	1722	1892	2058	2222	2388	2555	2722	2888	3055	3222	3388	0230	0397	0562	0725	0892
0235	0402	0567	0730	0897	1063	1227	1393	1560	1727	1897	2063	2227	2393	2560	2727	2893	3060	3227	3393	0235	0402	0567	0730	0897
0240	0407	0572	0735	0902	1068	1232	1398	1565	1732	1902	2068	2232	2398	2565	2732	2898	3065	3232	3398	0240	0407	0572	0735	0902
0245	0412	0577	0740	0907	1073	1237	1403	1570	1737	1907	2073	2237	2403	2570	2737	2903	3070	3237	3403	0245	0412	0577	0740	0907
0250	0417	0582	0745	0912	1078	1242	1408	1575	1742	1912	2078	2242	2408	2575	2742	2908	3075	3242	3408	0250	0417	0582	0745	0

TABLE M—*contd.*Ghatikas and Palas (Naligals and Vinadis) as Fractions of a day—*contd.*

N.B.—The same table will serve for minutes and seconds as fractions of an Hour or a Degree.

Ghatikas.					Pala.	Ghatikas.				Ghatikas.					Ghatikas.				
20	21	22	23	24		25	26	27	28	30	31	32	33	34	35	36	37	38	39
3333	3500	3667	3833	4000	0	4167	4333	4500	4667	4833	0	5000	5167	5333	5500	5667	0	5833	6000
3336	3503	3669	3836	4003	1	4169	4336	4503	4669	4836	1	5003	5169	5336	5503	5669	1	5836	6003
3339	3506	3672	3839	4006	2	4172	4339	4506	4672	4839	2	5006	5172	5339	5506	5672	2	5839	6006
3342	3508	3675	3842	4008	3	4175	4342	4508	4675	4842	3	5008	5175	5342	5508	5675	3	5842	6008
3344	3511	3678	3844	4011	4	4178	4344	4511	4678	4844	4	5011	5178	5344	5511	5678	4	5844	6011
3347	3514	3680	3847	4014	5	4180	4347	4514	4680	4847	5	5014	5180	5347	5514	5680	5	5847	6014
3350	3517	3683	3850	4017	6	4183	4350	4517	4683	4850	6	5017	5183	5350	5517	5683	6	5850	6017
3353	3519	3686	3853	4019	7	4186	4353	4519	4686	4853	7	5019	5186	5353	5519	5686	7	5853	6019
3355	3522	3689	3855	4022	8	4189	4355	4522	4689	4855	8	5022	5189	5355	5522	5689	8	5855	6022
3358	3525	3692	3858	4025	9	4192	4358	4525	4692	4858	9	5025	5192	5358	5525	5692	9	5858	6025
3361	3528	3694	3861	4028	10	4194	4361	4528	4694	4861	10	5028	5194	5361	5528	5694	10	5861	6028
3364	3530	3697	3864	4030	11	4197	4364	4530	4697	4864	11	5030	5197	5364	5530	5697	11	5864	6030
3367	3533	3700	3867	4033	12	4200	4367	4533	4700	4867	12	5033	5200	5367	5533	5700	12	5867	6033
3369	3536	3703	3869	4036	13	4203	4369	4536	4703	4869	13	5036	5203	5369	5536	5703	13	5869	6036
3372	3539	3705	3872	4039	14	4205	4372	4539	4705	4872	14	5039	5205	5372	5539	5705	14	5872	6039
3375	3542	3708	3875	4042	15	4208	4375	4542	4708	4875	15	5042	5208	5375	5542	5708	15	5875	6042
3378	3544	3711	3878	4044	16	4211	4378	4544	4711	4878	16	5044	5211	5378	5544	5711	16	5878	6044
3380	3547	3714	3880	4047	17	4214	4380	4547	4714	4880	17	5047	5214	5380	5547	5714	17	5880	6047
3383	3550	3717	3883	4050	18	4217	4383	4550	4717	4883	18	5050	5217	5383	5550	5717	18	5883	6050
3386	3553	3719	3886	4053	19	4219	4386	4553	4719	4886	19	5053	5219	5386	5553	5719	19	5886	6053
3389	3555	3722	3889	4055	20	4222	4389	4555	4722	4889	20	5055	5222	5389	5555	5722	20	5889	6055
3392	3558	3725	3892	4058	21	4225	4392	4558	4725	4892	21	5058	5225	5392	5558	5725	21	5892	6058
3394	3561	3728	3894	4061	22	4228	4394	4561	4728	4894	22	5061	5228	5394	5561	5728	22	5894	6061
3397	3564	3730	3897	4064	23	4230	4397	4564	4730	4897	23	5064	5230	5397	5564	5730	23	5897	6064
3400	3567	3733	3900	4067	24	4233	4400	4567	4733	4900	24	5067	5233	5400	5567	5733	24	5900	6067
3403	3569	3736	3903	4069	25	4236	4403	4569	4736	4903	25	5069	5236	5403	5569	5736	25	5903	6069
3405	3572	3739	3905	4072	26	4239	4405	4572	4739	4905	26	5072	5239	5405	5572	5739	26	5905	6072
3408	3575	3742	3908	4075	27	4242	4408	4575	4742	4908	27	5075	5242	5408	5575	5742	27	5908	6075
3411	3578	3744	3911	4078	28	4244	4411	4578	4744	4911	28	5078	5244	5411	5578	5744	28	5911	6078
3414	3580	3747	3914	4080	29	4247	4414	4580	4747	4914	29	5080	5247	5414	5580	5747	29	5914	6080
3417	3583	3750	3917	4083	30	4250	4417	4583	4750	4917	30	5083	5250	5417	5583	5750	30	5917	6083
3419	3586	3753	3919	4086	31	4253	4419	4586	4753	4919	31	5086	5253	5419	5586	5753	31	5919	6086
3422	3589	3755	3922	4089	32	4255	4422	4589	4755	4922	32	5089	5255	5422	5589	5755	32	5922	6089
3425	3592	3758	3925	4092	33	4258	4425	4592	4758	4925	33	5092	5258	5425	5592	5758	33	5925	6092
3428	3594	3761	3928	4094	34	4261	4428	4594	4761	4928	34	5094	5261	5428	5594	5761	34	5928	6094
3430	3597	3764	3930	4097	35	4264	4431	4597	4764	4930	35	5097	5264	5431	5597	5764	35	5930	6097
3433	3600	3767	3933	4100	36	4267	4433	4600	4767	4933	36	5100	5267	5433	5600	5767	36	5933	6100
3436	3603	3769	3936	4103	37	4269	4436	4603	4769	4936	37	5103	5269	5436	5603	5769	37	5936	6103
3439	3605	3772	3939	4105	38	4272	4439	4605	4772	4939	38	5105	5272	5439	5605	5772	38	5939	6105
3442	3608	3775	3942	4108	39	4275	4442	4608	4775	4942	39	5108	5275	5442	5608	5775	39	5942	6108
3444	3611	3778	3944	4111	40	4278	4444	4611	4778	4944	40	5111	5278	5444	5611	5778	40	5944	6111
3447	3614	3780	3947	4114	41	4280	4447	4614	4780	4947	41	5114	5280	5447	5614	5780	41	5947	6114
3450	3617	3783	3950	4117	42	4283	4450	4617	4783	4950	42	5117	5283	5450	5617	5783	42	5950	6117
3453	3619	3786	3953	4119	43	4285	4453	4619	4786	4953	43	5119	5286	5453	5619	5786	43	5953	6119
3455	3622	3789	3955	4122	44	4289	4455	4622	4789	4955	44	5122	5289	5455	5622	5789	44	5955	6122
3458	3625	3792	3958	4125	45	4292	4458	4625	4792	4958	45	5125	5292	5458	5625	5792	45	5958	6125
3461	3628	3794	3961	4128	46	4294	4461	4628	4794	4961	46	5128	5294	5461	5628	5794	46	5961	6128
3464	3630	3797	3964	4130	47	4297	4464	4630	4797	4964	47	5130	5297	5464	5630	5797	47	5964	6130
3467	3633	3800	3967	4133	48	4300	4467	4633	4800	4967	48	5133	5300	5467	5633	5800	48	5967	6133
3469	3636	3803	3969	4136	49	4303	4469	4636	4803	4969	49	5136	5303	5469	5636	5803	49	5969	6136
3472	3639	3805	3972	4139	50	4305	4472	4639	4805	4972	50	5139	5305	5472	5639	5805	50	5972	6139
3475	3642	3808	3975	4142	51	4308	4475	4642	4808	4975	51	5142	5308	5475	5642	5808	51	5975	6142
3478	3644	3811	3978	4144	52	4311	4478	4644	4811	4978	52	5144	5311	5478	5644	5811	52	5978	6144
3480	3647	3814	3980	4147	53	4314	4480	4647	4814	4980	53	5147	5314	5480	5647	5814	53	5980	6147
3483	3650	3817	3983	4150	54	4317	4483	4650	4817	4983	54	5150	5317	5483	5650	5817	54	5983	6150
3486	3653	3819	3986	4153	55	4319	4486	4653	4819	4986	55	5153	5319	5486	5653	5819	55	5986	6153
3489	3655	3822	3989	4155	56	4322	4489	4655	4822	4989	56	5155	5322	5489	5655	5822	56	5989	6155
3492	3658	3825	3992	4158	57	4325	4492	4658	4825	4992	57	5158	5325	5492	5658	5825	57	5992	6158
3494	3661	3828	3994	4161	58	4328	4494	4661	4828	4994	58	5161	5328	5494	5661	5828	58	5994	6161
3497	3664	3830	3997	4164	59	4330	4497	4664	4830	4997	59	5164	5330	5497	5664	5830	59	5997	6164

TABLE H—*contd.*Ghatikas and Palas (Nalgals and Vinadis) as Fractions of a day—*contd.*

N.B.—The same table will serve for minutes and seconds as fractions of an Hour or a Degree.

Ghaṭīkas.					Palas.	Ghaṭīkas.					Palas.	Ghaṭīkas.					Palas.	Ghaṭīkas.				
40	41	42	43	44		45	46	47	48	49		50	51	52	53	54		55	56	57	58	59
·6667	·6833	·7000	·7167	·7333	0	·7500	·7667	·7833	·8000	·8167	0	·8333	·8500	·8667	·8833	·9000	0	·9167	·9333	·9501	·9667	·9833
·6669	·6836	·7003	·7169	·7336	1	·7503	·7669	·7836	·8003	·8169	1	·8336	·8503	·8669	·8836	·9003	1	·9169	·9336	·9503	·9669	·9836
·6672	·6839	·7006	·7172	·7339	2	·7505	·7672	·7839	·8005	·8172	2	·8339	·8505	·8672	·8839	·9005	2	·9172	·9339	·9505	·9672	·9839
·6675	·6842	·7008	·7175	·7342	3	·7508	·7675	·7842	·8008	·8175	3	·8342	·8508	·8675	·8842	·9008	3	·9175	·9342	·9508	·9675	·9842
·6678	·6844	·7011	·7178	·7344	4	·7511	·7678	·7844	·8011	·8178	4	·8344	·8511	·8678	·8844	·9011	4	·9178	·9344	·9511	·9678	·9844
·6680	·6847	·7014	·7180	·7347	5	·7514	·7680	·7847	·8014	·8180	5	·8347	·8514	·8680	·8847	·9014	5	·9180	·9347	·9514	·9680	·9847
·6683	·6850	·7017	·7183	·7350	6	·7517	·7683	·7850	·8017	·8183	6	·8350	·8517	·8683	·8850	·9017	6	·9183	·9350	·9517	·9683	·9850
·6686	·6853	·7019	·7186	·7353	7	·7519	·7686	·7853	·8019	·8186	7	·8353	·8519	·8686	·8853	·9019	7	·9186	·9353	·9519	·9686	·9853
·6689	·6855	·7022	·7189	·7355	8	·7522	·7689	·7855	·8022	·8189	8	·8355	·8522	·8689	·8855	·9022	8	·9189	·9355	·9522	·9689	·9855
·6692	·6858	·7025	·7192	·7358	9	·7525	·7692	·7858	·8025	·8192	9	·8358	·8525	·8692	·8858	·9025	9	·9192	·9358	·9525	·9692	·9858
·6694	·6861	·7028	·7194	·7361	10	·7528	·7694	·7861	·8028	·8194	10	·8361	·8528	·8694	·8861	·9028	10	·9194	·9361	·9528	·9694	·9861
·6697	·6864	·7030	·7197	·7364	11	·7530	·7697	·7864	·8030	·8197	11	·8364	·8530	·8697	·8864	·9030	11	·9197	·9364	·9530	·9697	·9864
·6700	·6867	·7033	·7200	·7367	12	·7533	·7700	·7867	·8033	·8200	12	·8367	·8533	·8700	·8867	·9033	12	·9200	·9367	·9533	·9700	·9867
·6703	·6869	·7036	·7203	·7369	13	·7536	·7703	·7869	·8036	·8203	13	·8369	·8536	·8703	·8869	·9036	13	·9203	·9369	·9536	·9703	·9869
·6705	·6872	·7039	·7205	·7372	14	·7539	·7705	·7872	·8039	·8205	14	·8372	·8539	·8705	·8872	·9039	14	·9205	·9372	·9539	·9705	·9872
·6708	·6875	·7042	·7208	·7375	15	·7542	·7708	·7875	·8042	·8208	15	·8375	·8542	·8708	·8875	·9042	15	·9208	·9375	·9542	·9708	·9875
·6711	·6878	·7044	·7211	·7378	16	·7544	·7711	·7878	·8044	·8211	16	·8378	·8544	·8711	·8878	·9044	16	·9211	·9378	·9544	·9711	·9878
·6714	·6880	·7047	·7214	·7380	17	·7547	·7714	·7880	·8047	·8214	17	·8380	·8547	·8714	·8880	·9047	17	·9214	·9380	·9547	·9714	·9880
·6717	·6883	·7050	·7217	·7383	18	·7550	·7717	·7883	·8050	·8217	18	·8383	·8550	·8717	·8883	·9050	18	·9217	·9383	·9550	·9717	·9883
·6719	·6886	·7053	·7219	·7386	19	·7553	·7719	·7886	·8053	·8219	19	·8386	·8553	·8719	·8886	·9053	19	·9219	·9386	·9553	·9719	·9886
·6722	·6889	·7055	·7222	·7389	20	·7555	·7722	·7889	·8055	·8222	20	·8389	·8555	·8722	·8889	·9055	20	·9222	·9389	·9555	·9722	·9889
·6725	·6892	·7058	·7225	·7392	21	·7558	·7725	·7892	·8058	·8225	21	·8392	·8558	·8725	·8892	·9058	21	·9225	·9392	·9558	·9725	·9892
·6728	·6894	·7061	·7228	·7394	22	·7561	·7728	·7894	·8061	·8228	22	·8394	·8561	·8728	·8894	·9061	22	·9228	·9394	·9561	·9728	·9894
·6730	·6897	·7064	·7230	·7397	23	·7564	·7730	·7897	·8064	·8230	23	·8397	·8564	·8730	·8897	·9064	23	·9230	·9397	·9564	·9730	·9897
·6733	·6900	·7067	·7233	·7400	24	·7567	·7733	·7900	·8067	·8233	24	·8400	·8567	·8733	·8900	·9067	24	·9233	·9400	·9567	·9733	·9900
·6736	·6903	·7069	·7236	·7403	25	·7569	·7736	·7903	·8069	·8236	25	·8403	·8569	·8736	·8903	·9069	25	·9236	·9403	·9569	·9736	·9903
·6739	·6905	·7072	·7239	·7405	26	·7572	·7739	·7905	·8072	·8239	26	·8405	·8572	·8739	·8905	·9072	26	·9239	·9405	·9572	·9739	·9905
·6742	·6908	·7075	·7242	·7408	27	·7575	·7742	·7908	·8075	·8242	27	·8408	·8575	·8742	·8908	·9075	27	·9242	·9408	·9575	·9742	·9908
·6744	·6911	·7078	·7244	·7411	28	·7578	·7744	·7911	·8078	·8244	28	·8411	·8578	·8744	·8911	·9078	28	·9244	·9411	·9578	·9744	·9911
·6747	·6914	·7080	·7247	·7414	29	·7580	·7747	·7914	·8080	·8247	29	·8414	·8580	·8747	·8914	·9080	29	·9247	·9414	·9580	·9747	·9914
·6750	·6917	·7083	·7250	·7417	30	·7583	·7750	·7917	·8083	·8250	30	·8417	·8583	·8750	·8917	·9083	30	·9250	·9417	·9583	·9750	·9917
·6753	·6919	·7086	·7253	·7419	31	·7586	·7753	·7919	·8086	·8253	31	·8419	·8586	·8753	·8919	·9086	31	·9253	·9419	·9586	·9753	·9919
·6755	·6922	·7089	·7255	·7422	32	·7589	·7755	·7922	·8089	·8255	32	·8422	·8589	·8755	·8922	·9089	32	·9255	·9422	·9589	·9755	·9922
·6758	·6925	·7092	·7258	·7425	33	·7592	·7758	·7925	·8092	·8258	33	·8425	·8592	·8758	·8925	·9092	33	·9258	·9425	·9592	·9758	·9925
·6761	·6928	·7094	·7261	·7428	34	·7594	·7761	·7928	·8094	·8261	34	·8428	·8594	·8761	·8928	·9094	34	·9261	·9428	·9594	·9761	·9928
·6764	·6930	·7097	·7264	·7430	35	·7597	·7764	·7930	·8097	·8264	35	·8430	·8597	·8764	·8930	·9097	35	·9264	·9430	·9597	·9764	·9930
·6767	·6933	·7100	·7267	·7433	36	·7600	·7767	·7933	·8100	·8267	36	·8433	·8600	·8767	·8933	·9100	36	·9267	·9433	·9600	·9767	·9933
·6769	·6936	·7103	·7269	·7436	37	·7603	·7769	·7936	·8103	·8269	37	·8436	·8603	·8769	·8936	·9103	37	·9269	·9436	·9603	·9769	·9936
·6772	·6939	·7105	·7272	·7439	38	·7605	·7772	·7939	·8105	·8272	38	·8439	·8605	·8772	·8939	·9105	38	·9272	·9439	·9605	·9772	·9939
·6775	·6942	·7108	·7275	·7442	39	·7608	·7775	·7942	·8108	·8275	39	·8442	·8608	·8775	·8942	·9108	39	·9275	·9442	·9608	·9775	·9942
·6778	·6944	·7111	·7278	·7444	40	·7611	·7778	·7944	·8111	·8278	40	·8444	·8611	·8778	·8944	·9111	40	·9278	·9444	·9611	·9778	·9944
·6780	·6947	·7114	·7280	·7447	41	·7614	·7780	·7947	·8114	·8280	41	·8447	·8614	·8780	·8947	·9114	41	·9280	·9447	·9614	·9780	·9947
·6783	·6950	·7117	·7283	·7450	42	·7617	·7783	·7950	·8117	·8283	42	·8450	·8617	·8783	·8950	·9117	42	·9283	·9450	·9617	·9783	·9950
·6786	·6953	·7119	·7286	·7453	43	·7619	·7786	·7953	·8119	·8286	43	·8453	·8619	·8786	·8953	·9119	43	·9286	·9453	·9619	·9786	·9953
·6789	·6955	·7122	·7289	·7455	44	·7622	·7789	·7955	·8122	·8289	44	·8455	·8622	·8789	·8955	·9122	44	·9289	·9455	·9622	·9789	·9955
·6792	·6958	·7125	·7292	·7458	45	·7625	·7792	·7958	·8125	·8292	45	·8458	·8625	·8792	·8958	·9125	45	·9292	·9458	·9625	·9792	·9958
·6794	·6961	·7128	·7294	·7461	46	·7628	·7794	·7961	·8128	·8294	46	·8461	·8628	·8794	·8961	·9128	46	·9294	·9461	·9628	·9794	·9961
·6797	·6964	·7130	·7297	·7464	47	·7630	·7797	·7964	·8130													

TABLE H—*contd.*
Hours and Minutes as Fractions of a day.

Minutes.	Hours.				Minutes.	Hours.				Minutes.	Hours.				Minutes.	Hours.				seconds of hours as fractions of a day.
	0	1	2	3		4	5	6	7		8	9	10	11						
0	000000	041666	083333	125000	0	166666	208333	250000	291666	0	333333	375000	416666	458333	0	00000				
1	000694	042361	084027	125694	1	167361	209027	250694	292361	1	334027	375694	417361	459027	1	00001				
2	001388	043055	084722	126388	2	168055	209722	251388	293055	2	334722	376388	418055	459722	2	00002				
3	002083	043750	085416	127083	3	168750	210416	252083	293750	3	335416	377083	418750	460416	3	00003				
4	002777	044444	086111	127777	4	169444	211111	252777	294444	4	336111	377777	419444	461111	4	00004				
5	003472	045138	086805	128472	5	170138	211805	253472	295138	5	336805	378472	420138	461805	5	00006				
6	004166	045833	087500	129166	6	170833	212500	254166	295833	6	337500	379166	420833	462500	6	00007				
7	004861	046527	088194	129861	7	171527	213194	254861	296527	7	338194	379861	421527	463194	7	00008				
8	005555	047222	088888	130555	8	172222	213888	255555	297222	8	338888	380555	422222	463888	8	00009				
9	006250	047916	089583	131250	9	172916	214583	256250	297916	9	339583	381250	422916	464583	9	00010				
10	006944	048611	090277	131944	10	173611	215277	256944	298611	10	340277	381944	423611	465277	10	00012				
11	007638	049305	090972	132638	11	174305	215972	257638	299305	11	340972	382638	424305	465972	11	00013				
12	008333	050000	091666	133333	12	175000	216666	258333	300000	12	341666	383333	425000	466666	12	00014				
13	009027	050694	092361	134027	13	175694	217361	259027	300694	13	342361	384027	425694	467361	13	00015				
14	009722	051388	093055	134722	14	176388	218055	259722	301388	14	343055	384722	426388	468055	14	00016				
15	010416	052083	093750	135416	15	177083	218750	260416	302083	15	343750	385416	427083	468750	15	00017				
16	011111	052777	094444	136111	16	177777	219444	261111	302777	16	344444	386111	427777	469444	16	00018				
17	011805	053472	095138	136805	17	178472	220138	261805	303472	17	345138	386805	428472	470138	17	00019				
18	012500	054166	095833	137500	18	179166	220833	262500	304166	18	345833	387500	429166	470833	18	00020				
19	013194	054861	096527	138194	19	179861	221527	263194	304861	19	346527	388194	429861	471527	19	00022				
20	013888	055555	097222	138888	20	180555	222222	263888	305555	20	347222	388888	430555	472222	20	00023				
21	014583	056250	097916	139583	21	181250	222916	264583	306250	21	347916	389583	431250	472916	21	00024				
22	015277	056944	098611	140277	22	181944	223611	265277	306944	22	348611	390277	431944	473611	22	00025				
23	015972	057638	099305	140972	23	182638	224305	265972	307638	23	349305	390972	432638	474305	23	00027				
24	016666	058333	100000	141666	24	183333	225000	266666	308333	24	350000	391666	433333	475000	24	00028				
25	017361	059027	100694	142361	25	184027	225694	267361	309027	25	350694	392361	434027	475694	25	00029				
26	018055	059722	101388	143055	26	184722	226388	268055	309722	26	351388	393055	434722	476388	26	00030				
27	018750	060416	102083	143750	27	185416	227083	268750	310416	27	352083	393750	435416	477083	27	00031				
28	019444	061111	102777	144444	28	186111	227777	269444	311111	28	352777	394444	436111	477777	28	00032				
29	020138	061805	103472	145138	29	186805	228472	270138	311805	29	353472	395138	436805	478472	29	00034				
30	020833	062500	104166	145833	30	187500	229166	270833	312500	30	354166	395833	437500	479166	30	00035				
31	021527	063194	104861	146527	31	188194	229861	271527	313194	31	354861	396527	438194	479861	31	00036				
32	022222	063888	105555	147222	32	188888	230555	272222	313888	32	355555	397222	438888	480555	32	00037				
33	022916	064583	106250	147916	33	189583	231250	272916	314583	33	356250	397916	439583	481250	33	00038				
34	023611	065277	106944	148611	34	190277	231944	273611	315277	34	356944	398611	440277	481944	34	00039				
35	024305	065972	107638	149305	35	190972	232638	274305	315972	35	357638	399305	440972	482638	35	00040				
36	025000	066666	108333	150000	36	191666	233333	275000	316666	36	358333	400000	441666	483333	36	00042				
37	025694	067361	109027	150694	37	192361	234027	275694	317361	37	359027	400694	442361	484027	37	00043				
38	026388	068055	109722	151388	38	193055	234722	276388	318055	38	359722	401388	443055	484722	38	00044				
39	027083	068750	110416	152083	39	193750	235416	277083	318750	39	360416	402083	443750	485416	39	00045				
40	027777	069444	111111	152777	40	194444	236111	277777	319444	40	361111	402777	444444	486111	40	00046				
41	028472	070138	111805	153472	41	195138	236805	278472	320138	41	361805	403472	445138	486805	41	00047				
42	029166	070833	112500	154166	42	195833	237500	279166	320833	42	362500	404166	445833	487500	42	00049				
43	029861	071527	113194	154861	43	196527	238194	279861	321527	43	363194	404861	446527	488194	43	00050				
44	030555	072222	113888	155555	44	197222	238888	280555	322222	44	363888	405555	447222	488888	44	00051				
45	031250	072916	114583	156250	45	197916	239583	281250	322916	45	364583	406250	447916	489583	45	00052				
46	031944	073611	115277	156944	46	198611	240277	281944	323611	46	365277	406944	448611	490277	46	00053				
47	032638	074305	115972	157638	47	199305	240972	282638	324305	47	365972	407638	449305	490972	47	00054				
48	033333	075000	116666	158333	48	200000	241666	283333	325000	48	366666	408333	450000	491666	48	00055				
49	034027	075694	117361	159027	49	200694	242361	284027	325694	49	367361	409027	450694	492361	49	00057				
50	034722	076388	118055	159722	50	201388	243055	284722	326388	50	368055	409722	451388	493055	50	00058				
51	035416	077083	118750	160416	51	202083	243750	285416	327083	51	368750	410416	452083	493750	51	00059				
52	036111	077777	119444	161111	52	202777	244444	286111	327777	52	369444	411111	452777	494444	52	00060				
53	036805	078472	120138	161805	53	203472	245138	286805	328472	53	370138	411805	453472	495138	53	00061				
54	037500	079166	120833	162500	54	204166	245833	287500	329166	54	370833	412500	454166	495833	54	00062				
55	038194	079861	121527	163194	55	204861	246527	288194	329861	55	371527	413194	454861	496527	55	00064				
56	038888	080555	122222	163888	56	205555	247222	288888	330555	56	372222	413888	455555	497222	56	00065				
57	039583	081250	122916	164583	57	206250	247916	289583	331250	57	372916	414583	456250	497916	57	00066				
58	040277	081944	123611	165277	58	206944	248611	290277	331944	58	373611	415277	456944	498611	58	00067				
59	040972	082638	124305	165972	59	207638	249305	290972	332688	59	374305	415972	457638	499305	59	00068				

TABLE H—*contd.*Hours and Minutes as Fractions of a day—*contd.*

Minutes.	Hours.				Minutes.	Hours.				Minutes.	Hours.				Minutes.	Seconds of hours as fractions of a day.
	12	13	14	15		16	17	18	19		20	21	22	23		
0	.5000000	.5416666	.5833333	.6250000	0	.6666666	.7083333	.7500000	.7916666	0	.8333333	.8750000	.9166666	.9583333	0	.00000
1	.5006944	.5423611	.5840277	.6256944	1	.6673611	.7090277	.7506944	.7923611	1	.8340277	.8756944	.9173611	.9590277	1	.00001
2	.5013888	.5430555	.5847222	.6263888	2	.6680555	.7097222	.7513888	.7930555	2	.8347222	.8763888	.9180555	.9597222	2	.00002
3	.5020833	.5437500	.5854166	.6270833	3	.6687500	.7104166	.7520833	.7937500	3	.8354166	.8770833	.9187500	.9604166	3	.00003
4	.5027777	.5444444	.5861111	.6277777	4	.6694444	.7111111	.7527777	.7944444	4	.8361111	.8777777	.9194444	.9611111	4	.00005
5	.5034722	.5451388	.5868055	.6284722	5	.6701388	.7118055	.7534722	.7951388	5	.8368055	.8784722	.9201388	.9618055	5	.00006
6	.5041666	.5458333	.5875000	.6291666	6	.6708333	.7125000	.7541666	.7958333	6	.8375000	.8791666	.9208333	.9625000	6	.00007
7	.5048611	.5465277	.5881944	.6298611	7	.6715277	.7131944	.7548611	.7965277	7	.8381944	.8798611	.9215277	.9631944	7	.00008
8	.5055555	.5472222	.5888888	.6305555	8	.6722222	.7138888	.7555555	.7972222	8	.8388888	.8805555	.9222222	.9638888	8	.00009
9	.5062500	.5479166	.5895833	.6312500	9	.6729166	.7145833	.7562500	.7979166	9	.8395833	.8812500	.9229166	.9645833	9	.00010
10	.5069444	.5486111	.5902777	.6319444	10	.6736111	.7152777	.7569444	.7986111	10	.8402777	.8819444	.9236111	.9652777	10	.00012
11	.5076388	.5493055	.5909722	.6326388	11	.6743055	.7159722	.7576388	.7993055	11	.8409722	.8826388	.9243055	.9659722	11	.00013
12	.5083333	.5500000	.5916666	.6333333	12	.6750000	.7166666	.7583333	.8000000	12	.8416666	.8833333	.9250000	.9666666	12	.00014
13	.5090277	.5506944	.5923611	.6340277	13	.6756944	.7173611	.7590277	.8006944	13	.8423611	.8840277	.9256944	.9673611	13	.00015
14	.5097222	.5513888	.5930555	.6347222	14	.6763888	.7180555	.7597222	.8013888	14	.8430555	.8847222	.9263888	.9680555	14	.00016
15	.5104166	.5520833	.5937500	.6354166	15	.6770833	.7187500	.7604166	.8020833	15	.8437500	.8854166	.9270833	.9687500	15	.00017
16	.5111111	.5527777	.5944444	.6361111	16	.6777777	.7194444	.7611111	.8027777	16	.8444444	.8861111	.9277777	.9694444	16	.00018
17	.5118055	.5534722	.5951388	.6368055	17	.6784722	.7201388	.7618055	.8034722	17	.8451388	.8868055	.9284722	.9701388	17	.00020
18	.5125000	.5541666	.5958333	.6375000	18	.6791666	.7208333	.7625000	.8041666	18	.8458333	.8875000	.9291666	.9708333	18	.00021
19	.5131944	.5548611	.5965277	.6381944	19	.6798611	.7215277	.7631944	.8048611	19	.8465277	.8881944	.9298611	.9715277	19	.00022
20	.5138888	.5555555	.5972222	.6388888	20	.6805555	.7222222	.7638888	.8055555	20	.8472222	.8888888	.9305555	.9722222	20	.00023
21	.5145833	.5562500	.5979166	.6395833	21	.6812500	.7229166	.7645833	.8062500	21	.8479166	.8895833	.9312500	.9729166	21	.00024
22	.5152777	.5569444	.5986111	.6402777	22	.6819444	.7236111	.7652777	.8069444	22	.8486111	.8902777	.9319444	.9736111	22	.00025
23	.5159722	.5576388	.5993055	.6409722	23	.6826388	.7243055	.7659722	.8076388	23	.8493055	.8909722	.9326388	.9743055	23	.00027
24	.5166666	.5583333	.6000000	.6416666	24	.6833333	.7250000	.7666666	.8083333	24	.8500000	.8916666	.9333333	.9750000	24	.00028
25	.5173611	.5590277	.6006944	.6423611	25	.6840277	.7256944	.7673611	.8090277	25	.8506944	.8923611	.9340277	.9756944	25	.00029
26	.5180555	.5597222	.6013888	.6430555	26	.6847222	.7263888	.7680555	.8097222	26	.8513888	.8930555	.9347222	.9763888	26	.00030
27	.5187500	.5604166	.6020833	.6437500	27	.6854166	.7270833	.7687500	.8104166	27	.8520833	.8937500	.9354166	.9770833	27	.00031
28	.5194444	.5611111	.6027777	.6444444	28	.6861111	.7277777	.7694444	.8111111	28	.8527777	.8944444	.9361111	.9777777	28	.00032
29	.5201388	.5618055	.6034722	.6451388	29	.6868055	.7284722	.7701318	.8118055	29	.8534722	.8951388	.9368055	.9784722	29	.00034
30	.5208333	.5625000	.6041666	.6458333	30	.6875000	.7291666	.7708333	.8125000	30	.8541666	.8958333	.9375000	.9791666	30	.00035
31	.5215277	.5631944	.6048611	.6465277	31	.6881944	.7298611	.7715277	.8131944	31	.8548611	.8965277	.9381944	.9798611	31	.00036
32	.5222222	.5638888	.6055555	.6472222	32	.6888888	.7305555	.7722222	.8138888	32	.8555555	.8972222	.9388888	.9805555	32	.00037
33	.5229166	.5645833	.6062500	.6479166	33	.6895833	.7312500	.7729166	.8145833	33	.8562500	.8979166	.9395833	.9812500	33	.00038
34	.5236111	.5652777	.6069444	.6486111	34	.6902777	.7319444	.7736111	.8152777	34	.8569444	.8986111	.9402777	.9819444	34	.00039
35	.5243055	.5659722	.6076388	.6493055	35	.6909722	.7326388	.7743055	.8159722	35	.8576388	.8993055	.9409722	.9826388	35	.00040
36	.5250000	.5666666	.6083333	.6500000	36	.6916666	.7333333	.7750000	.8166666	36	.8583333	.9000000	.9416666	.9833333	36	.00042
37	.5256944	.5673611	.6090277	.6506944	37	.6923611	.7340277	.7756944	.8173611	37	.8590277	.9006944	.9423611	.9840277	37	.00043
38	.5263888	.5680555	.6097222	.6513888	38	.6930555	.7347222	.7763888	.8180555	38	.8597222	.9013888	.9430555	.9847222	38	.00044
39	.5270833	.5687500	.6104166	.6520833	39	.6937500	.7354166	.7770833	.8187500	39	.8604166	.9020833	.9437500	.9854166	39	.00045
40	.5277777	.5694444	.6111111	.6527777	40	.6944444	.7361111	.7777777	.8194444	40	.8611111	.9027777	.9444444	.9861111	40	.00046
41	.5284722	.5701388	.6118055	.6534722	41	.6951388	.7368055	.7784722	.8201388	41	.8618055	.9034722	.9451388	.9868055	41	.00047
42	.5291666	.5708333	.6125000	.6541666	42	.6958333	.7375000	.7791666	.8208333	42	.8625000	.9041666	.9458333	.9875000	42	.00049
43	.5298611	.5715277	.6131944	.6548611	43	.6965277	.7381944	.7798611	.8215277	43	.8631944	.9048611	.9465277	.9881944	43	.00050
44	.5305555	.5722222	.6138888	.6555555	44	.6972222	.7388888	.7805555	.8222222	44	.8638888	.9055555	.9472222	.9888888	44	.00051
45	.5312500	.5729166	.6145833	.6562500	45	.6979166	.7395833	.7812500	.8229166	45	.8645833	.9062500	.9479166	.9895833	45	.00052
46	.5319444	.5736111	.6152777	.6569444	46	.6986111	.7402777	.7819444	.8236111	46	.8652777	.9069444	.9486111	.9902777	46	.00053
47	.5326388	.5743055	.6159722	.6576388	47	.6993055	.7409722	.7826388	.8243055	47	.8659722	.9076388	.9493055	.9909722	47	.00054
48	.5333333	.5750000	.6166666	.6583333	48	.7000000	.7416666	.7833333	.8250000	48	.8666666	.9083333	.9500000	.9916666	48	.00055
49	.5340277	.5756944	.6173611	.6590277	49	.7006944	.7423011	.7840277	.8256944	49	.8673611	.9090277	.9506944	.9923611	49	.00057
50	.5347222	.5763888	.6180555	.6597222	50	.7013888	.7430555	.7847222	.8263888	50	.8680555	.9097222	.9513888	.9930555	50	.00058
51	.5354166	.5770833	.6187500	.6604166	51	.7020833	.7437500	.7854166	.8270833	51	.8687500	.9104166	.9520833	.9937500	51	.00059
52	.5361111	.5777777	.6194444	.6611111	52	.7027777	.7444444	.7861111	.8277777	52	.8694444	.9111111	.9527777	.9944444	52	.00060
53	.5368055	.5784722	.6201388	.6618055	53	.7034722	.7451388	.7868055	.8284722	53	.8701388	.9118055	.9534722	.9951388	53	.00061
54	.5375000	.5791666	.6208333	.6625000	54	.7041666	.7458333	.7875000	.8291666	54	.8708333	.9125000	.9541666	.9958333	54	.00062
55	.5381944	.5798611	.6215277	.6631944	55	.7048611	.7465277	.7881944	.8298611	55	.8715277	.9131944	.9548611	.9965277	55	.00064
56	.5388888	.5805555	.6222222	.6638888	56	.7055555	.7472222	.7888888	.8305555	56	.8722222	.9138888	.9555555	.9972222	56	.00065
57	.5395833	.5812500	.6229166	.6645833	57	.7062500	.7479166	.7895833	.8312500	57	.8729166	.9145833	.9562500	.9979166	57	.00066
58	.5402777	.5819444	.6236111	.6652777	58	.7069444	.7486111	.7902777	.8319444	58	.8736111	.9152777	.9569444	.9986111	58	.00067
59	.5409722	.5826388	.6243055	.6659722	59	.7076388	.7493055	.7909722	.8326388	59	.8743055	.9159722	.9576388	.9993055	59	.00068

PART V.--PROBLEMS ON THE PANCHANG AND HOROSCOPE.

SPECIMEN PROBLEMS ON THE PANCHANG EYE-TABLES.

This Eye-table alone will enable any one to solve correctly, to two decimal places of a day, and by a single operation, any problem in solar dates, nakshatras, or week-days, for 5,100 years, i.e., from B.C. 3102 to A.D. 1990. The tables of equations are given to two places of decimals in the abridged sections e to i of the Eye-table--see page 34, 35 and to four places of decimals in the unabridged sections e to i, pages 171 to 188 of the larger work.

The computation of the ending moment, whether of a tithi, a nakshatra, or a yoga, always comprises four processes: (1) to find the mean ending moment, (2) to find the anomaly or anomalies for that moment, (3) to find the equation or equations corresponding to the anomaly or anomalies, and (4) to add together the mean ending moment and the equation or equations.

Problem I.—Required to find the ending moment, by Śīrya Siddhānta, of Āshāḍha Śukla 12, A.D. 1924. Note stages (1) to (10).

Commencement of solar year. Col. 1.	Days of solar year and Sun's anomaly in days of S. Yr. Col. 2.	Moon's anomaly. Col. 3.
A.D. 1900 .. Apr. 12 62041 k 24 years .. 21015 n	First new moon in solar year { A.D. 1900 .. 16-70809 I 24 years 4-37446 o A.D. 1924 .. 21-08275 (2)	14-35017 m 3-84739 p 21-08255 (2) (1st N.M. in solar year). 39 28011 -27-55460 d (2 anom. months). 11-72551 (3) (C's An. at 1st N.M. in S. Yr.)
A.D. 1924-25 .. Apr. 12-83056 (1) N.B.—This, by itself, is a valuable piece of information, giving the English year, month, day and fraction of day on which a particular Indian solar year between 3102 B.C. and A.D. 2000 commenced, and it may be had in a few seconds from the Eye-table, sections k and n for any one of 5,100 years.	Add for Āshāḍha new moon .. 59-0612 h Do. 12 tithis .. 11-8122 d 91-9560 (4)	3-952 e .. 11-812 d 27-490 -041 (C's equation--h). 27-45 (5)
Note how stages (1), (2), (3), (4), (5), (6), (7) and (8) are successively arrived at with the help of the Eye-table and then add together (4), (8) and (1), as shown in column 2.	Sum of C's and C's eqns. (col. 3) .. -03 (8) Add commencement of solar year A.D. 484-5. Apr. 12-83 (1) Apr. 104-76 (9)	C's eqn. for An. of 92 d. (4) .. 04 h (6) C's eqn. for An. of 27-45 d. (5) .. +01 e (7) Sum of C's and C's eqns. -03 (8)

We reach, for the ending moment of the tithi, the result, March 104-76 (9). By Eye-table q, the 92nd day from April 1 is July 1. The 104th day from April 1 is July 1 + 12 = July 13. q; and by Eye-table r, 76 of a day = 45 ghatikas and 01 day = 37 palas .. (10).

For the week-day, we have, for 13 July A.D. 1924, by Eye-table j, 2 + 2 + 5 + 13 = 22; 22 ÷ 7 leaves remainder 1, i.e., Sunday. The ending moment of the tithi was 45 ghatikas 37 palas after mean sunrise, on Sunday, 13 July A.D. 1924 .. (10).

Problem II.—Problem I worked with the aid of Eye-tables y, e and h.

N.B.—The above problem can be worked in a much shorter time with the additional help of Eye table y.

	Days of S. Yr. and Sun's anomaly.	Moon's mean anomaly in days.
First new moon in solar year A.D. 1924-25 ..	21-08 (2)	11-73 (8)
Eye-table y. Āshāḍha Śu. 12 ..	70-87	15-76 (y)
	91-95 (4)	27-49
Eye-table h. C's eqn. for anomaly of 92 days ..	-04 33000	C's eqn. -04
Eye-table e. C's eqn. for anomaly of 27-45 days ..	+01 (7)	27-45
	-03 -03 (8)	
	91-92	

Add English month and day, marking commencement of Indian solar year A.D. 1924-25 ..

Apr. 12-83 (1)

Apr. 104-75 (9) July 13, A.D. 1924, 45 ghatikas after mean sunrise (Eye-tables q and r).

Problem III.—Required the ending moment of nakshatra UTTARA PHALGUNI (No. 12) in Phalgunā lunar month, A.D. 1921-22.

N.B.—We do not need C's An. for this problem.

- (1) First new moon in Solar year A.D. 1921-22 as in (2) *supra* .. 24-23 days.
- (2) Nakshatra correction appropriate to (1) according to Eye-tables t & u 0-41 - 0-02 .. 0-39 "
- (3) Shortest interval from new moon at commencement of Phalgunā mo. to nak. No. 12 15-33 "

Interval in days, from 1st new moon in Solar year to new moon beginning Phalgunā mo. 295-31 (y)
335-26 "

(m & p)	Moon's anomaly at commencement of Indian Solar year A.D. 1921-22, 24-60 d.
Add for	1st new moon in " " " " +24-23
(e)	" " " new moon beginning Phalgunā month +19-76
(2) & (3)	" " " mean ending moment Nak. Uttara Phalguni, 15-33+0-39 +15-72
	84-31
(d)	Deduct 3 anom. months .. 82-66
	1-65
(f)	" " " " Moon's nakshatra equation for anom. of days 1-05
	-13
(4)	" " " " 335-13 days.
(i)	In problem I. Commencement according to English Calendar of Indian Solar year 1921-22. April 13-05 "
	April 348-18 "

By Eye-table q, April 348 counted from April 1 of previous year = 1+13 = 14 March of next year. Ending moment of Nakshatra No. 12 UTTARA PHALGUNI in Phalgunā lunar month of the year A.D. 1921-22 is 18 of a day or 11 ghatikas after mean sunrise on 14 March A.D. 1922, which is correct according to Ind. Eph. Vol. VII, p. 246.

Problem IV.—Calculation of ending moment of Yoga. See the example in paragraph 34, page 7 ante.

PROBLEMS ON LAGNA, MEAN AND LOCAL SUNRISE.

Table T.L. (pp. 40—46), is intended to enable the student to calculate lagna, local sunrise and local time for tithis and nakshatras. It is an extract from Table III of the larger work which gives similar tables for all latitudes in India. It is of use in working certain problems of quite ordinary occurrence. The examples given below are worked out for the latitude of Madras (13° N.): for other latitudes use the method of interpolations indicated in the Preface, p. iv.

I. One problem is, what is the correction for the tropical longitude of the Sun, or of a lagna, on a particular day? The table gives the corrections on the assumption that the tropical longitude is the same as the sidereal longitude: but in any given case the table has to be applied with certain modifications which are explained at page 40 of the larger work. Briefly, the modification is this. For the period A.D. 1800 to A.D. 2000 the correction for tropical longitude has to be found in the present Table against the Day of the year which is represented by the actual day *plus* 20. Thus, required the correction for tropical longitude on the 200th day of the Indian Solar year in the year 1900 A.D. at Madras. We look for 200 + 20, i.e., the 220th day and determine the correction to be *minus* 257 seconds of time.

II. A second problem is, what addition has to be made in order to convert mean into local time? Three corrections are necessary, one for the equation of time, which for the 200th day of the Indian Solar year, is + 472 seconds. The next correction is for tropical longitude, for which purpose, as we have just seen, we should apply the correction entered in the table against the 220th day, i.e., -257 seconds of time. The third is a correction for terrestrial longitude which for Madras is + 012 of a day. The total of all corrections for any day in the year for the period A.D. 1800 to A.D. 2000 is entered against each day in the fourth column of the table. For the 200th day it is + 015, which is arrived at by adding -257" + 472" + 012 of a day.

III. A third problem of frequent occurrence is this, by what interval of time does actual sunrise precede or follow mean local sunrise (6 a.m.) on a particular day? For this we add the corrections for equation of time and tropical longitude and reverse the sign of the total.

IV. A fourth problem is, what was the lagna at a particular moment when a birth took place? We shall work out this problem presently.

V. A fifth problem is, at what moment on a given day was a particular portion, or degree, of the ecliptic, lagna? We shall work out this problem also.

(i) We take problem IV first. Suppose a child was born at Madras at 12 noon, Madras standard time, on 1st April A.D. 1915; determine the lagna. The formula for the approximate lagna is $A + 359B$, where A is the actual sidereal longitude of the Sun at the moment of birth and B is the interval in time or (which is nearly the same thing) the fraction of a degree, marking the progress of the Sun between actual sunrise and the moment of birth; and the formula for the actual lagna is $A + 359B + \frac{T.L.L. - T.L.S.}{a}$ where T.L.L. is the correction, according to the present table, for A , and T.L.S. the correction for $(A + 359B)$, and a is the divisor in the table given below, showing the number of seconds taken by a degree of the ecliptic to rise above the horizon. If we prefer we may substitute for $(A + 359B)$ the expression $Am + 360B$, where Am is the Sun's sidereal longitude at actual local sunrise.

(ii) *Time (in seconds) taken by a degree of the ecliptic to rise above the horizon.*

Signs of the zodiac.	Degrees of ecliptic.		Latitude.	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°
I	0°—30°	XII	330°—360°	210	208	206	204	202	201	199	197	195	194	192	190	188	186
II	30—60	XI	300—330	229	227	226	224	223	221	220	218	217	215	214	212	211	206
III	60—90	X	270—300	253	253	252	252	251	251	250	250	249	248	248	247	246	249
IV	90—120	IX	240—270	263	263	264	264	265	266	266	267	267	268	268	269	270	270
V	120—150	VIII	210—240	250	251	253	254	256	257	259	260	262	263	265	266	268	269
VI	150—180	VII	180—210	238	238	239	241	243	244	246	248	250	252	254	255	257	259
Signs of the zodiac	Degrees of ecliptic.		Latitude.	22°	23°	24°	25°	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°
I	0—30	XII	330°—360	184	182	180	178	176	174	172	170	168	165	163	161	159	157
II	30—60	XI	300—330	208	206	205	203	201	199	197	196	194	192	190	188	186	184
III	60—90	X	270—300	245	244	244	243	242	242	241	240	239	238	238	237	237	236
IV	90—120	IX	240—270	271	273	273	274	274	275	275	276	277	277	278	278	279	280
V	120—150	VIII	210—240	270	272	274	276	278	279	281	283	285	287	289	291	293	295
VI	150—180	VII	180—210	261	263	265	267	269	271	273	275	278	280	282	284	286	288

(iii) The moment of birth is 25 of the day (Indian time) or noon reckoned from mean local sunrise. Neglecting for the present the reduction from Madras Standard time to Madras Mean time and also neglecting the difference between mean Lanka sunrise and mean Madras sunrise, we may say that the time of birth was April 1.25, mean Lanka time. Since April 1 A.D. 1915 is the 366th day reckoned from 1st April 1914 and the Indian Solar year 1914—15 A.D. began on April 13.2430 (Eye-tables k and n), we have, as the number of days of the Indian Solar year elapsed at the moment of birth, April 366.25 *minus* April 13.2430 = 353.007 days, for which the sidereal longitude by Table P.A. is $345.7783^\circ + 2.1736^\circ + .007 \times .9856^\circ = 347.9588^\circ$. The approximate lagna is therefore $347.96^\circ + 359 \times .25^\circ = 437.71^\circ$ or 77.71° .

(iv) We have next to find T.L.L. and T.L.S. For T.L.L. we should convert the approximate lagna 77.71° into days at 1.0146 day per degree. Result 78.84 days. We look in the present table against 79 + 20 = 99 days and find T.L.L. to be + 1217 seconds. We find T.L.S. as in problem I against 353 + 20 = 373 or 9th day, i.e., + 351 seconds. The divisor a required to work out our formula completely is that for the sign of the lagna tropically considered which is Kataka or Sign IV; a is 266.

(v) The lagna required is therefore $A + 359B + \frac{T.L.L. - T.L.S.}{a} = 347.96^\circ + 359 \times .25^\circ + \frac{1217 - 351}{266} = 77.71^\circ + \frac{86}{266} = 77.71^\circ + 3.2'$ (nearly) = 80.9° or nearly 21 degrees in Mithuna.

(vi) We may next put the converse problem V, what time should be fixed as Muhurtha on 1st April 1915 in order that the middle of Mithuna (75°) may be Lagna exactly?

(vii) The formula for this is: Approximate time is $\frac{L - Am}{360}$, where L is the Lagna, increased by 360° , if necessary, and Am the Sun's sidereal longitude at actual local sunrise, for which, as before, we may substitute roughly the Sun's sidereal longitude at mean Lanka sunrise.

(viii) The actual time of lagna, making the same assumption as before as to mean sunrise, is $\frac{L - Am}{360} - (T.L.L. - T.L.S.)$.

(ix) In the present case L is 75° ; Am is the sidereal longitude corresponding to (April 366.0 *minus* April 13.2430), i.e., 352.7570 days of the Indian Solar year. This sidereal longitude is by Table P.A. $344.793^\circ + 2.172^\circ + .757 \times .9856^\circ = 347.71^\circ$.

(x) T.L.L. is the correction by the present table for $75 \times 1.0146 + 20$ days or 96 days, i.e., + 1290 seconds. T.L.S. is that for 373 days or 9th Solar day, i.e., + 351 seconds, and actual time of Lagna is $\frac{L - Am}{360} - (T.L.L. - T.L.S.) = \frac{75 - 347.71}{360}$ of 1 day - $(1290 - 351) = .2425$ day *minus* $939^\circ = 5$ hours 49' 12" *minus* 15' 39" = 5 hours 33' 33", or 13 gh. 54 palas after mean sunrise.

(xi) The above workings will be quite accurate enough for ordinary purposes, but when a lagna is on the margin between two rāsis, a more accurate method will be necessary to determine on which side of the margin the lagna lies. This difficulty may be expected to occur in problem IV but not in problem V.

(xii) The formula for the approximate lagna in problem IV is (A+359B) or (Am+360B). We shall work out the first formula accurately for which purpose we shall want A, i.e., the exact sidereal longitude of the Sun at the moment of birth. The time of birth is noon, Madras Standard time. This should be diminished by 9 minutes for Madras Mean time because, Madras Standard time includes an artificial addition of 9 minutes to Madras Mean time since 1st July 1906. We thus get, as the time of birth in Madras Mean time, 5 hours 21', i.e., 24375 of a day. For corresponding Lanka mean time we require an addition, according to line 2 of the present table, (353rd day), of -012, i.e., the moment of birth in Lanka Mean time is 2437 - 012 = 232 of the day. Note that +012 is the addition to Mean Lanka time on account of Mean Madras time; and therefore, to obtain the former from the latter, we subtract 012.

(xiii) The sidereal longitude of the Sun on April 366·232 is that corresponding to April 366·232 minus April 13·243 = 2890 days.

(xiv) This longitude is by Table P.A., 347·9405°. For the approximate lagna we want 359B, where B is the exact time which has elapsed up to the moment of birth since actual Madras sunrise. The correction for this is to be found as directed in problem III; for the 354th day of the Indian Solar year A.D. 1914-15, it is -422 seconds + 351 seconds = -71 seconds of time. We use this without change of sign (why?) and B exactly is 2435 of day minus 71" = 24293 of day.

(xv) The approximate lagna is now A+359B or 347·9405° + 359 × 24293" = 435° 1524" or 75° 15', a difference of 2 76 degrees as compared with the result of our first working. The actual lagna will be $75^{\circ} 15' + \frac{T.L.L. - T.L.S.}{a} = 75^{\circ} 15' + \frac{1268 - 351}{266} = 75^{\circ} 15' + \frac{915}{266} = 75^{\circ} 15' + 3^{\circ} 14' = 78^{\circ} 59'$ or $18\frac{1}{2}^{\circ}$ in Mithuna.

(xvi) In problem V if we take, as we ought to do in theory, the sidereal longitude of the Sun at actual local (i.e., Madras) sunrise, we shall not find so great a difference in the result. The addition to be made to mean Lanka time, whether at sunrise or at any other moment in order to get the interval after actual Madras sunrise is indicated in Col. 4 of the present table (354th day) as +011 of a day. The number of days of the Indian Solar year which have elapsed up to actual Madras sunrise on 1st April 1915 is 352·7570 + 011 = 352·768 days; and the corresponding sidereal longitude, by Table P.A., is 347·7240 degrees. The approximate time of lagna = $\frac{75 - 347 \cdot 72}{360} = 2424$ day = 5 hrs. 49. The actual time of lagna will be 5 hrs. 49' less 15' 39" (see § 12 supra) = 5 hours 33' 21" or 13 ghatikas 52 palas, after actual Madras sunrise or 5 hours 43' 32", Madras Standard time.

N.B.—Convert hours after actual Madras sunrise into hours after mean Madras sunrise, and the latter into Madras standard time. 5 hrs. 33' 21" + 71" + 9" = 5 hrs. 43' 32".

PROBLEMS IN PLANETARY POSITIONS AND HOROSCOPES.

The historian and the epigraphist in India are not seldom confronted with a task elsewhere reserved for astronomers, namely, to assign to its proper date a definite allusion to an ancient planetary position or a horoscope. The following illustrations are purposely drawn from a wide range of literature, Western as well as Eastern, and are intended to show how far the present compendium will help in solving many problems of a class, hitherto considered insoluble except by astronomers, and not always correctly solved even by them. It is unfortunately the case that a general search in Indian literature for dates, through horoscopes, is foredoomed to failure, but even a negative conclusion of that kind, scientifically established, is of more value than mere surmise.

We shall first deal with what is perhaps the earliest astronomical link between the Far and the Near East. We read, at p. 4 of LOCKYER'S *Star-gazing*, of a Chinese observation of the conjunction of five planets between 2514 and 2436 B.C. The same conjunction is apparently referred to in the following terms in CHAMBERS' *Sun, Planets and Comets*: "A conjunction of Mars, Jupiter, Saturn and Mercury in the constellation of *Shi* was assumed as an epoch by the Emperor Chuen-hio." The author has shown at pp. 123 and 124 of his *Indian Chronology* (2nd edition) that such a conjunction actually took place on the 10th day of the Indian Solar Year, B.C. 2449 (2nd March), the fifth planet being the Moon. It is a strange, if not also a noteworthy, coincidence that the following verse, quoted from Garga by VARĪHAMĪHIRA, an Indian astronomer of the 6th century A.D., is found to indicate, when interpreted naturally and literally, the same year, B.C. 2449 which there figures as the epoch of Yudhishtira: "Āsan maghāsū munayah śasata prithivīm Yudhishtīre nripatau || śhad dvika pancadyvutah śakakālah tasya rājāsya ||" i.e., "the Munis or Saptarishis were in Magha nakshatra in the reign of Yudhishtira which preceded the Śaka epoch by 2526 years." The Śaka epoch, A.D. 78, diminished by 2526 years, gives us minus 2448 A.D., or B.C. 2449, which is the Chinese epoch above referred to.

Now what was the position of the four planets on the 10th day of the Indian Solar year B.C. 2449? We have.

From Table P.B.				Mars.	Mercury.	Jupiter.	(Venus)	Saturn.
				Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
B.C. 2501	..	..	..	181·57	108·93	254·55	8·65	122·86
52 Yrs.	..	..	..	233·07	327·53	138·07	189·87	275·39
10 days	..	..	..	5·24	40·92	0·83	16·02	0·33
				419·88	477·38	393·45	(214·54)	398·58
or,				59·88	117·38	33·45	(214·54)	38·58
Actual geocentric places by Table P.E. . .				47·0	27·0	32·2	(330·0)	34·5

It can be calculated from the *Sūrya Siddhānta* Eye-table (pp. 1—6 supra) that the longitude of the Moon during the day in question was 40° to 46° according to the time of day, so that this was a good epoch for starting six out of nine planets from longitude 0° in the Kṛttikās.

II

In order to acquire some further practice in manipulating these tables, we may next try to verify the extraordinary conjunction (mentioned in CHAMBERS' *Sun, Planets and Comets*), of eight planets in, or very close to, Kanyā rāśi, on 14th September A.D. 1186, which was the 174th day of the Indian Solar year and which was also a day of new moon (·80 of day). In English reckoning this new moon occurred in India at 1 a.m. on Monday, 15th September 1186. The calculations for the moment of new moon (174 completed days) are as follow:—

Table P.B.	Mars.	Mercury.	Jupiter.	Venus.	Saturn.	Rāhu.	Sun.	Moon.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
A.D. 1100	200·54	325·58	65·36	332·11	191·61	237·62	—	—
(Years) 86	260·85	29·36	89·88	286·33	330·84	224·81	—	—
(Days) 174	91·88	352·07	14·46	278·77	5·82	9·22	167·18	167·18
	553·27	707·01	169·70	897·21	528·17	3·59	167·18	167·18
	193·27	347·01	169·70	177·21	168·17	3·59	167·18	167·18

Actual geocentric place by Table P.E. . . 178·2 176·6 169·7 171·2 174·3 3·6 167·2 167·2

If Rāhu's longitude was 3·6, that of Ketu must have been 183·6 so that eight planets, the maximum number possible (because if Ketu is included, Rāhu must be excluded), were located within an arc of 16 degrees and most of them within an arc of 11 degrees.

III

We shall next consider the most famous of all Indian horoscopes, that of Rāma in the Rāmāyaṇa, which runs as follows, according to the Southern text: "In the 12th month, Chaitra, on the 9th tithi, on a day of nakshatra Punarvasī, when five planets were in their houses of exaltation and when Jupiter was in Karkātaka as lagna along with the Moon, the Emperor of all the worlds, Rāma, was born." The first point to be attended to is to secure four starting points for Mars, Jupiter Saturn and Venus respectively with the help of Table P.B. or Table P.D.; and for this purpose we must first adopt an approximate day of the Solar year, suitable for our operations. In the present case it will be, say, the 10th day: this being so, we might make a start with the four mean longitudes which we obtained in problem I for the 10th day of the Indian Solar year, B.C. 2449; i.e.

	MARS.	MERCURY.	JUPITER.	VENUS.	SATURN.	Rahu.	KETU.	SUN.	MOON.
A.D. 1376, Aśvina ba. 10. 197th day of Solar Year.	197°5'	179°8'	180°	177°5'	317°8'	284°	104°	190°	118°
Wednesday 8th October	Tula.	Kanya.	Tula.	Kanya.	Kumbha.	Makara.	Karkātaka.	Tula.	Karkātaka.

The planets are all in the required positions and we need have no doubt but that the date intended was Wednesday, 8th October A.D. 1376 within two hours before sunrise, since Kanya Rāśi was Lagna.

V. THE GENERAL METHOD WITH AN ILLUSTRATION, VIZ., A HOROSCOPE WITH 5 OR 6 EXALTED PLANETS.

If we wish to investigate the question whether any particular horoscope of which we do not know the date was realized on any past date, and if not, when it is likely to be realized in future, we might follow the method indicated in Section III *supra* (Rāma's horoscope) or Section VI *infra* (the Paripādāl horoscope). When we know the epoch within 500 years (as in the case of the Paripādāl horoscope) or the exact day of the Solar year on which a horoscope must fall (e.g., the 200th day, as in the example on p. 105 below from Brihatjātaka, Ch. XI r. 7), then the model in Section VI may be followed. But in other cases, and especially when we wish to show for purposes of argument or demonstration that a particular horoscope occurred either once or not at all during a period of several thousand years, we shall save time as well as labour by employing the following GENERAL METHOD:—

Supposing we have a horoscope before us in which while the Sun is in Mēsha (0 day to 31st completed day of the Indian Solar year), Mars also is in Mēsha (0° to 30° actual geocentric place which we shall abbreviate as "G.P."), Mercury in Rishabha (30° to 60° G.P.), Venus is in Mīna (330° to 0° G.P.), Jupiter in Mīna (330° to 0° G.P.), Saturn in Makara (270° to 300° G.P.) and Rāhu in Kanya (150° to 180° G.P.), and we wish to know whether such a horoscope has occurred during the last 5,000 years (it actually occurred on 1st May 1904) and if so, how often, the General Method of Table O.D. below will enable us to assign to the horoscope its Own Date (hence it is called Table O.D.). By way of explanation we shall first of all confine our attention to the positions of Sun and Mars, although, when actually using the method, we may take in all the planets together at a glance.

The first condition of the problem is, that on some particular date when the Sun is in Mēsha, i.e., between 0 day and 31st completed day of the Indian Solar year (Panchang Eye-table a, p. 34 *supra*), Mars has to be between 0° and 30° G.P. We know that on 0 day of the Indian Solar year B.C. 1, Mars' m.l. (i.e., mean longitude) was 255° (p. 53 *supra*), and that on 31st completed day of the same year his m.l. was 271° (ib.); and we wish to discover the maximum and minimum increase above these longitudes, or above any longitude intermediate between them, which would be compatible with Mars being in Mēsha rāśi and that in Mēsha month in any subsequent year.

By hypothesis the horoscope under investigation must coincide with some day between 0 day exactly and the 31st day exactly of a Solar year; and Mars may have for his G.P. anything between 0° and 30°. Four extreme positions are thus indicated, four boundaries as it were, between which must lie the planet's position in the horoscope under investigation. The boundaries are:—

Col. 1	Col. 2	Col. 3.
G.P. means "actual geocentric place."	M.L. means "mean longitude"	M.L. means "mean longitude."
(1) On 0 day the G.P. of Mars may be 0°	and the corresponding M.L. would then be 353°; (Eye-table p. 55)	in which case the increase of Mars' M.L. above his M.L. on 0 day of B.C. 1 would be 353° minus 255° = 98°
(2) On 0 day the G.P. of Mars may be 30°	and his corresponding M.L. (Eye-table p. 55) 39°;	in which case the increase of Mars' M.L. above his M.L. on 0 day of B.C. 1 would be 39° minus 255° = 144°.
(3) On the 31st day the G.P. of Mars may be 0°	and his corresponding M.L. (Eye-table p. 55) 335°;	in which case the increase of Mars' M.L. above his M.L. on 31st day of B.C. 1 would be 335° minus 271° = 64°.
(4) On the 31st day the G.P. of Mars may be 30°	and his corresponding M.L. (Eye-table p. 55) 20°;	in which case the increase of Mars' M.L. above his M.L. on 31st day of B.C. 1 would be 20° minus 271° = 109°.

Our four boundaries now are the four figures reached in col. 3, viz., 98°, 144°, 64°, 109°; and since two of these figures 98° and 109° are contained in the interval between the two others, 64° and 144°, we are justified in concluding that Mars' mean longitude in the horoscope under investigation must lie between (271° + 64°) and (255° + 144°). We enter the limits 64° and 144° (omitting 255° and 271°) in the first line of Table O.D. under Mars, "0° to 30° G.P." All the remaining figures entered in Table O.D. for the various planets are determined in the same way by going through the four processes detailed in cols. 1, 2 and 3 above. The words "additions for M.L." appearing in the head-lines of Table O.D. for Mars, Jupiter and Saturn (and these words as well as their meaning are to be applied in the same way in the tables for Mercury, Venus and Rāhu), mean "additions to be made to the mean longitude of the planet on any day of A.D. 0 (= B.C. 1) according to Table P.D. (pp. 53—54) in order to arrive at the position of the planet contemplated in the horoscope under investigation." In other words, taking as a base the mean longitudes of the planets on any day in A.D. 0 (= B.C. 1) and calling that horoscope A, the Tables O.D. and O'D. form, as it were, a bridge whereon we are conducted safely and securely to the date of any other horoscope B which we may have under investigation. Table O.D. for Rāhu presents less difficulty though it is on the same plan, because in the case of Rāhu as well as Ketu we do not differentiate between mean longitude and actual geocentric place.

It may puzzle the reader somewhat that it should be necessary to table these additions so elaborately as is done on the next three pages; but he will see, when he comes to study the example worked out on pp. 100, 101 below, that Table O.D., in conjunction with its extract Table O'D., (which has to be made fresh for each horoscope), has the following important advantages, all in the direction of saving time. (1) It saves four lines of work which would be necessary if we followed in every case the method observed in regard to Rāma's horoscope (p. 96): these are the four lines numbered (1), (2), (3) and (4) in section VI on the Paripādāl Horoscope (p. 103). (2) It avoids constant recourse to Table P.D. (pp. 53, 54), which would be necessary if every time we failed to locate a horoscope in one period of 500 years, we had to try another similar period, starting from another base in Table P.D. (3) In the case of Mercury and Venus, it enables us to pursue a line of investigation parallel to that followed in regard to Mars, Jupiter and Saturn; but with this additional precaution that it takes account of the movement of the planets Mercury and Venus for ten days at a time instead of for a month at a time. Another precaution is taken in regard to the same planets by noting in the columns headed G.P. or "actual geocentric place," the longitude up to which or down to which either of these planets proceeds during any period for part of which it is retrograde. For instance, on the 100th day of the Indian Solar year, Venus is liable to retrograde from the 60th to the 51st degree of longitude, rising thereafter again to the 60th degree. Or again, on the 90th day of the Indian Solar year, Mercury may advance from 90° to 111° and then retrograde from 111° to 90°. In these cases the minimum 51° and the maximum 111° as the case may be are duly noted in the G.P. columns of Venus and Mercury.

Table O.D.—See Explanation on pp. 97 and 99.

Days of Solar year.	G.P. 0° to 30° Addi- tion for M.L. in degrees.	G.P. 30° to 60° Addi- tion for M.L. in degrees.	G.P. 60° to 90° Addi- tion for M.L. in degrees.	G.P. 90° to 120° Addi- tion for M.L. in degrees.	G.P. 120° to 150° Addi- tion for M.L. in degrees.	G.P. 150° to 180° Addi- tion for M.L. in degrees.	G.P. 180° to 210° Addi- tion for M.L. in degrees.	G.P. 210° to 240° Addi- tion for M.L. in degrees.	G.P. 240° to 270° Addi- tion for M.L. in degrees.	G.P. 270° to 300° Addi- tion for M.L. in degrees.	G.P. 300° to 330° Addi- tion for M.L. in degrees.	G.P. 330° to 0° Addi- tion for M.L. in degrees.
MASS.												
0 to 31st day.	64 144	109 190	158 231	209 260	251 279	280 294	297 306	309 322	319 344	333 17	355 55	24 98
31st to 62nd day.	34 109	74 158	124 209	176 251	229 280	271 297	296 309	311 319	322 333	331 355	343 24	3 64
62nd to 94th day.	10	42 124	86 176	138 229	195 271	248 296	287 311	310 322	323 331	332 343	340 3	352 34
94th to 125th day.	1	21 86	54 138	101 195	157 248	208 287	264 310	301 323	322 332	333 340	342 352	350 10
125th to 156th day.	1 21	12 54	33 101	70 157	121 208	177 264	232 301	278 322	312 333	332 342	348 350	352
156th to 187th day.	6 12	11 33	24 70	47 121	88 177	140 232	196 278	247 312	289 332	322 348	341 352	350
187th to 216th day.	3 11	13 24	23 47	39 88	67 140	105 196	160 247	213 289	260 323	299 341	330 350	350
216th to 246th day.	0 13	14 23	25 39	37 67	56 105	86 160	129 213	178 260	226 299	271 330	308 350	339
246th to 276th day.	351 14	13 25	28 37	42 56	58 86	78 129	107 178	148 226	193 271	238 308	280 339	318 0
276th to 305th day.	330 13	5 28	29 42	46 58	63 78	79 107	99 148	126 193	164 238	207 280	249 318	291 351
305th to 335th day.	300 5	343 29	21 46	48 63	67 79	85 99	98 126	117 164	142 207	176 249	216 291	258 330
335th to 365th day.	267 343	313 21	359 48	40 69	67 88	85 103	98 125	117 142	131 176	153 216	186 258	224 300
JUPITER.												
0 to 31st day.	188 230	221 262	254 294	289 323	322 350	352 17	20	47 72	72 101	98 131	127 163	157 193
31st to 62nd day.	182 221	214 254	248 289	283 322	318 352	352 20	21	49 72	75 97	99 126	125 156	155 186
62nd to 94th day.	178 214	206 248	233 283	274 318	310 352	347 23	21 51	52 77	79 101	104 127	128 155	155 185
94th to 125th day.	176 206	202 238	232 274	265 310	305 347	340 21	17 52	51 79	80 104	107 128	130 153	153 183
125th to 156th day.	177 202	201 232	228 265	260 305	294 340	332 17	11	49 80	81 107	109 130	134 153	153 183
156th to 187th day.	181 201	203 228	228 260	255 294	287 332	323 11	1	40 81	64 109	108 134	135 156	156 186
187th to 217th day.	184 203	206 228	229 255	254 287	283 323	317 1	353 40	33 64	70 108	104 135	135 157	157 187
217th to 246th day.	185 206	209 229	231 254	256 283	283 317	313 353	346 33	24 70	60 104	97 135	130 160	160 190
246th to 276th day.	185 209	210 231	233 256	259 283	284 313	312 346	343 24	18	53	90 130	124 159	159 189
276th to 305th day.	181 210	210 233	237 259	263 284	288 312	314 343	343 18	14 53	46	81 124	117 156	156 186
305th to 335th day.	174 210	206 237	236 263	264 288	291 314	317 343	343 14	12 46	42 81	75 115	108 149	149 179
335th to 365th day.	166 206	199 236	231 264	263 292	291 319	317 346	343 13	12 42	41 75	70 108	100 141	133 174
SATURN.												
0 to 31st day.	293 327	323 355	352 23	20 48	49 75	77 103	106 133	136 164	166 198	200 232	232 265	265 295
31st to 62nd day.	288 323	318 352	347 20	16 49	46 77	76 106	106 136	137 166	167 198	198 230	228 261	261 291
62nd to 94th day.	286 318	314 347	343 16	13 46	43 76	74 106	105 137	138 167	169 198	201 228	229 258	258 288
94th to 125th day.	285 314	312 343	340 13	8 43	39 74	70 105	104 138	136 169	171 201	204 229	232 258	258 288
125th to 156th day.	287 312	312 340	339 8	7 39	37 70	68 104	103 136	136 171	172 204	204 232	234 260	260 290
156th to 187th day.	290 312	313 339	338 6	3 37	31 68	63 103	98 136	133 172	170 204	204 234	235 262	262 292
187th to 216th day.	292 313	316 338	339		30 63	60 98	92 133	129 170	167 204	202 235	235 263	263 293
216th to 246th day.	293 316	318 339	340		29 60	58 92	90 129	124 167	162 202	199 235	232 266	266 296
246th to 276th day.	293 318	319 340	343	6 29	30 58	58 90	87 124	120 162	158 199	196 232	230 265	265 295
276th to 305th day.	291 319	319 343	344	8 30	31 58	58 87	87 120	119 158	154 196	191 230	227 263	263 293
305th to 335th day.	288 319	316 344	344	9 31	34 58	61 87	88 119	118 154	152 191	187 227	222 260	260 290
335th to 365th day.	284 316	314 344	342	10 34	35 61	62 88	90 118	120 152	151 187	185 222	220 257	257 287
RANG.												
0 to 31st day.	262 292	232 262	202 232	172 202	142 172	112 142	82 112	52 82	22 52	352 22	322 352	292 322
31st to 62nd day.	260 290	230 260	200 230	170 200	140 170	110 140	80 110	50 80	20 50	350 20	320 350	290 320
62nd to 94th day.	258 288	228 258	198 228	168 198	138 168	108 138	78 108	48 78	18 48	348 18	318 348	288 318
94th to 125th day.	257 287	227 257	197 227	167 197	137 167	107 137	77 107	47 77	17 47	347 17	317 347	287 317
125th to 156th day.	255 285	225 255	195 225	165 195	135 165	105 135	75 105	45 75	15 45	345 15	315 345	285 315
156th to 187th day.	253 283	223 253	193 223	163 193	133 163	103 133	73 103	43 73	13 43	343 13	313 343	283 313
187th to 217th day.	252 282	222 252	192 222	162 192	132 162	102 132	72 102	42 72	12 42	342 12	312 342	282 312
217th to 246th day.	250 280	220 250	190 220	160 190	130 160	100 130	70 100	40 70	10 40	340 10	310 340	280 310
246th to 276th day.	249 279	219 249	189 219	159 189	129 159	99 129		39 69	9 39	339 9	309 339	279 309
276th to 305th day.	247 277	217 247	187 217	157 187	127 157	97 127	67 97	37 67	7 37	337 7	307 337	277 307
305th to 335th day.	245 275	215 245	185 215	155 185	125 155	95 125	65 95	35 65	5 35	335 5	305 335	275 305
335th to 365th day.	244 274	214 244	184 214	154 184	124 154	94 124	64 94	34 64	4 34	334 4	304 334	274 304

Table O.D. This Table enables us to take the first step in assigning any horoscope to its Own Date. Taking as a base the mean longitude of any planet on a particular day in the Indian Solar year A.D. 0 (= B.C. 1), we fix in this table once for all the additional (or in the case of Rāhu, the reduced) longitude which must be attained by the same planet in order to conform to a given horoscope: and by means of the extract from this table, called O.D. (p. 101), and with the aid of Table P.F. (pp. 60, 61) we may discover the actual year in the manner exemplified on pp. 101, 102.

Table O.D. (contd.).—Venus.—Additions to M.L. of Venus in B.C. 1 (= A.D. 0)

Days of Solar year.	Actual G.P.	Mean longitude	Actual G.P.	Mean longitude	Actual G.P.	Mean longitude	Actual G.P.	Mean longitude	Actual G.P.	Mean longitude	Actual G.P.	Mean longitude
	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees
0	0	30 47 132	30 45 30 132 232	30	0 232 247	0	330 247 261	330 315 330 261 357	330	0 357 57		
10	0	30 29 100	30 55 30 100 220	30	0 220 232	0	330 232 253	330 323 330 253 309	330	0 309 29		
20	0	30 358 71	30 60 71 152	60 65	60 152 198	30	0 219 232	0 340 8 232 357				
				60	30 198 219							
30	0	30 327 41	30 60 41 116	60 74	60 116 202	60	30 202 216	30 0 216 232	0 343	0 232 327		
31	0	30 324 39	30 60 39 114	60 74	60 114 202	60	30 202 215	30 0 215 232	0 343	0 232 324		
40	0	30 293 11	30 60 11 83	60 84	60 83 202	60	30 202 215	30 0 215 233	0 352	0 233 293		
50	30 3	30 214 342	30 60 342 54	60	90 54 137	90 93	60 137 200	60 30 200 213				
60	30 12	30 211 312	30 60 312 25	60	90 25 98	90 103	90 98 182	90 30 182 198	60 53	30 198 211		
62	30 12	30 211 309	30 60 309 19	60	90 19 80	90 103	90 80 181	90 60 181 197	60	30 197 211		
70	30 22	30 214 278	30 60 278 355	60	90 355 69	90 113	90 69 183	90 60 183 196	60	30 196 214		
80	30	60 234 324	60 90 324 39	90	120 39 124	120 123	120 124 161	120 90 161 180	90	60 180 194		
	60	20 194 234										
90	60 41	60 182 296	60 90 296 8	90	120 8 83	120 132	120 83 162	120 90 162 168	90	60 168 192		
94	60	90 282 356	90 120 356 71	120 132	120 71 158	120	90 158 176	90 60 176 192	60 45	60 192 282		
100	60 54	60 193 262	60 90 262 340	90	120 340 52	120 141	120 52 161	120 90 161 176	90	60 176 193		
110	60	90 210 308	90 120 308 22	120	150 22 110	150 151	150 110 132	150 120 132 159	120	90 159 172		
	90	60 172 210										
120	90 70	90 171 277	90 120 277 352	120	150 352 67	150 160	150 67 140	150 120 140 157	120	90 157 171		
125	90 70	90 172 261	90 120 261 336	120	150 336 51	150 170	150 51 140	150 120 140 156	120	90 156 172		
130	90 79	90 172 245	90 120 245 321	120	150 321 35	150 171	150 35 142	150 120 142 155	120	90 155 172		
140	90 88	90 178 206	90 120 206 292	120	150 292 5	150	180 5 92	180 150 92 140	150	120 140 152		
			120 90 152 178									
150	120 98	120 151 261	120 150 261 334	150	180 334 55	180 190	180 55 121	180 150 121 138	150	120 138 151		
156	120 103	120 151 244	120 150 244 319	150	180 319 33	180 200	180 33 120	180 150 120 136	150	120 136 151		
160	120 107	120 152 230	120 150 230 305	150	180 305 18	180 200	180 18 122	180 150 122 136	150	120 136 152		
170	120 118	120 157 191	120 150 191 274	150	180 274 347	180	210 347 84	210 180 84 120	180	150 120 133		
			120 133 157									
180	150 127	150 132 245	150 180 245 318	180	210 318 32	210 222	210 32 102	210 180 102 119	180	150 119 132		
187	150 132	150 133 224	150 180 224 296	180	210 296 13	210 224	210 13 107	210 180 107 115	180	150 115 132		
190	150 137	150 132 212	150 180 212 288	180	210 288 0	210 230	210 0 103	210 180 103 117	180	150 117 132		
200	150 147	150 138 176	150 180 176 256	180	210 256 329	210	240 329 66	240 210 66 102	210	190 102 115		
			180 150 115 138									
210	180 157	180 113 226	180 210 226 300	210	240 300 17	240 250	240 17 84	240 210 84 100	210	180 100 113		
217	180 160	180 115 206	180 210 206 281	210	240 281 356	240 255	240 356 82	240 210 82 96	210	180 96 115		
220	180 167	180 114 194	180 210 194 269	210	240 269 342	240 260	240 342 86	240 210 86 98	210	180 98 114		
-30	180 177	180 118 158	180 210 158 241	210	240 241 311	240	270 311 38	270 240 38 84	240	210 84 97		
			210 180 97 116									
240	210 186	210 97 210	210 240 210 282	240	270 282 355	270 281	270 355 67	270 240 67 83	240	210 83 97		
246	210 192	210 96 191	210 240 191 262	240	270 262 336	270 276	270 336 67	270 240 67 81	240	210 81 69		
250	210 197	210 95 179	210 240 179 251	240	270 251 324	270 291	270 324 68	270 240 68 81	240	210 81 65		
260	210 207	210 100 140	210 240 140 222	240	270 222 293	270	300 293 20	300 301 300 20 40	300	270 40 67		
			240 210 78 100		270 240 67 78							
270	240 217	240 78 190	240 270 190 262	270	300 262 339	300 311	300 339 49	300 270 49 66	270	240 66 78		
276	240 222	240 75 170	240 270 170 243	270	300 243 319	300 316	300 319 50	300 270 50 66	270	240 66 75		
280	240 227	240 78 158	240 270 158 232	270	300 232 305	300 321	300 305 51	300 270 51 64	270	240 64 78		
290	240 237	240 85 119	240 270 119 202	270	300 202 275	300	330 275 22	330 300 22 50	300	270 50 61		
			270 240 61 85									
300	270 248	270 61 171	270 300 171 244	300	330 244 319	330 341	330 319 32	330 300 32 48	300	270 48 61		
305	270 255	270 61 156	270 300 156 227	300	330 227 300	330 346	330 300 31	330 300 31 47	300	270 47 61		
310	270 257	270 60 138	270 300 138 214	300 297	300 214 228	300	330 228 285	330 330 285 33	330	300 33 47		
			300 270 47 60									
320	270 268	270 69 99	270 300 99 184	300	330 184 254	330	0 254 4	0 330 4 32	330	300 32 44		
			300 270 44 69									
330	0 11	0 302 14	0 330 14 29	330	330 29 43	330 278	330 43 153	330 330 153 226	330	0 226 302		
335	0 16	0 243 14	0 330 14 28	330	330 28 47	330 283	330 47 137	330 330 137 210	330	0 210 243		
340	0 20	0 268 15	0 330 15 27	330	330 27 42	330 288	330 42 120	330 330 120 195	330	0 195 268		
350	0	30 238 326	30 31 30 326 346	30	0 346 14	0	330 14 26	330 300 26 49	300 298	300 49 81		
						330	0 166 238	330 330 91 168				
360	0	30 208 284	30 30 284 355	30	0 355 12	0	330 12 25	330 330 25 135	330	0 135 208		

Table O.D. (contd.)—Mercury.—Additions to M.L. of B.C. 1 (= A.D. 0)—*vide* note at the top of p. 99.

Days of Solar year.	Actual G.P.		Mean longitude.		Actual (t.P.)		Mean longitude.		Actual G.P.		Mean longitude.		Actual G.P.		Mean longitude.	
	Degrees.				Degrees.				Degrees.				Degrees.			
0	0	17	0	168	317	0	332	0	317	168						
10	0	27	0	96	304	0	343	0	304	96						
20	0	353	0	296	26	0	30	26	140		30	38	30	140	239	
30	30	4	30	228	70	30	47	30	70	228						
31	30	48	30	63	226	30	5	30	226	63						
40	30	14	30	216	359	30	60	359	137		60		30	137	216	
50	30	25	30	212	284	30	60	284	42		60	70	60	42	152	
60	60	36	60	142	331	60	81	60	331	142						
62	60	82	60	317	137	60	48	60	137	317						
70	60	16	60	129	260	60	90	260	24		90	91	90	24	61	
80	60		90	180	303	90		60	303	180						
90	90	68	90	52	233	90	111	90	233	52						
94	90	115	90	217	154	90	72	90	154	217						
100	90	78	90	10	162	90	120	162	288			90	288	40		
110	90	89	90	38	80	90	120	80	210		120	132	120	210	333	
120	120	99	120	322	140	120	142	120	140	322						
125	120	146	120	107	313	120	104	120	313	107						
130	120	109	120	309	70	120		150	70	199	150	152	150	199	240	
140	120		150	308	116	150	162	150	116	241	150		120	241	308	
150	150	129	150	228	50	150	171	150	50	228						
156	150	175	150	7	221	150	134	150	221	7						
160	150	138	150	217	339	150		180	339	111	180		150	111	217	
170	150	148	150	212	261	150		180	261	29	180	190	180	29	144	
180	180	157	180	322	322											
187	180	162	180	122	276	180	204	180	276	122						
190	180	167	180	116	250	180	209	180	250	116						
200	180	176	180	107	177	180		210	177	299	210	217	210	299	43	
210	210	185	210	29	233	210	227	210	233	29						
217	210	190	210	21	190	210	233	210	190	21						
220	210	194	210	15	166	210	236	210	166	15						
230	210	203	210	2	95	210		240	95	217	240	244	240	217	297	
240	240	212	240	290	117	240	254	240	147	290						
246	240	218	240	279	407	240	259	240	107	279						
250	240	222	240	274	79	240	263	240	79	274						
260	240		270	262	140	270	272	270	140	193	270		240	193	262	
270	240		270	286	61	270	282	270	61	190	270		240	190	286	
276	270	245	270	182	23	270	287	270	23	182						
280	270	249	270	175	5	270	291	270	5	175						
290	270	259	270	163	289	270		300	289	61	300		270	61	163	
300	270		300	160	335	300	310	300	335	93	300		270	93	160	
305	300	273	300	87	300	300	311	300	300	87						
310	300	277	300	79	267	300	320	300	267	79						
320	300	287	300	66	199	300		330	199	330	330		300	330	66	
330	300		330	120	243	330	340	330	243	357	330		300	357	120	
335	330	302	330	353	207	330	345	330	207	353						
340	330	307	330	346	173	330	351	330	173	346						
350	0		330	232	333	330	317	330	333	103	330		0	103	232	
360	0	356	0	147	266	0		330	266	330	330	327	330	330	28	

We shall now proceed to illustrate the use of Table O.D. by means of an example which, however disappointing the result may appear to be, we are entitled nevertheless to call a practical example, because it will clear the air of a number of illusory, but altogether illusory horoscopes, e.g., the horoscope of Rāma, the horoscope of Raghu, the horoscope of Harsha, the horoscope of Sankara and a host of others. The notion that a chakravartin is necessarily born with a horoscope in which five or six planets are exalted is a familiar figure of speech in Indian literature, and the General Method by Table O.D. will convince us that it is no more than a figure of speech. A horoscope with six planets in exaltation means one in which the Sun is in Mēsha (0 to 31st day of the year), the Moon in Rishabha (30° to 60° G.P.), Mars in Makara (270° to 300° G.P.), Jupiter in Karkātaka (90° to 120° G.P.), Saturn in Tula (180° to 210° G.P.), and Venus in Mīna (330° to 0° G.P.). For such a problem we want an extract from Table O.D. in a form which we may call O'D., and of which the object will be to extend our search at a single glance to a period of 5,000 years or more. We have to remember that Table P.F. (pp. 60, 61) enables us to search for 474 years (and a little more) at a time and that at the end of 474 years, Mars' M.L. increases by 6° 09', Jupiter's M.L. decreases by 15° 32', Saturn's M.L. increases by 31° 85' and Venus' M.L. increases by 180°. In our endeavours to solve Rāma's horoscope (p. 96 *supra*) and the Paripādā horoscope (pp. 102 to 104 *infra*) we proceeded on first principles and used only Tables P.D., P.E. and P.F. to help us in our search. But such a search, to be effective and more especially when it has to be spread over several periods of 500 years, requires constant shifting of our basic year in Table P.D. For instance in the course of the search for the Paripādā horoscope (p. 104 *infra*) we have to shift the *point de repère* from 0 A.D. to 500 A.D. and in other cases we may have to shift again to B.C. 601 or A.D. 1000, to B.C. 1101 or A.D. 1500, etc. Table O.D., as remarked on p. 97, enables us to avoid this shifting of ground, and Table O'D. below is ancillary to O.D.: all we have to do for Table O'D. is to extract from, i.e., lift bodily out of, Table O.D. the figures we want for our particular horoscope and enter them as shown below in a central line against A.D. 0 (= B.C. 1). We next fill up a number of lines above and below this central line, increasing or decreasing the central figures by $\pm 6^{\circ} 09'$ in the case of Mars, by $\pm 15^{\circ} 32'$ in the case of Jupiter, by $\pm 31^{\circ} 85'$ in the case of Saturn and by 180° in the case of Venus. If we were concerned also with Mercury and Rāhu, we would have to remember that the cyclic difference for 474 years in their case is $\pm 36^{\circ} 38'$ and $\pm 175^{\circ} 38'$ respectively and therefore we would have to add progressively $36^{\circ} 38'$ and $175^{\circ} 38'$ respectively as we go back from B.C. 1 and deduct progressively the same quantities as we advance from B.C. 1 to A.D. 474, A.D. 948, etc.

Table O'D'.—Extract from Table O.D. indicating Additions (to Mean Longitudes of Mars, Jupiter, Saturn and Venus on 0 to 31st day of B.C. 1, according to Table P.D., pp. 53, 54, to be searched for in Table P.F. (pp. 60, 61), in order to obtain a horoscope with 5 or 6 exalted planets.

Result of Search, A.D. 948 plus 94 = A.D. 1042 (7th April).

	First new moon in Solar year.	MARS. 0 to 31st day G.P. 270° to 300°.	JUPITER. 0 to 31st day G.P. 90° to 120°.	SATURN. 0 to 31st day G.P. 180° to 210°.	VENUS.							
					31st day G.P. 0-343-0.	30th day G.P. 0-343-0.	20th day G.P. 0-340-0.	10th day G.P. 0-330.	0 day G.P. 0-330.	10th day G.P. 330-0.	0 day G.P. 330-0.	
A.D.—3318 = B.C. 3319 ..	3·2	16 60	182 216	329 356	52 144	52 147	52 177	52 73	67 81	129 207	177 246	
A.D.—2844 = B.C. 2845 ..	8·4	10 54	197 231	297 324	232 324	232 327	232 357	232 253	247 261	309 27	357 66	
A.D.—2370 = B.C. 2371 ..	13·6	3 47	212 246	265 292	52 144	52 147	52 177	52 73	67 81	129 207	177 246	
A.D.—1896 = B.C. 1897 ..	18·8	357 41	228 262	233 260	232 324	232 327	232 357	232 253	247 261	309 27	357 66	
A.D.—1422 = B.C. 1423 ..	24·0	351 35	243 277	202 229	52 144	52 147	52 177	52 73	67 81	129 207	177 246	
A.D.—948 = B.C. 949 ..	29·1	345 29	258 292	170 197	232 324	232 327	232 357	232 253	247 261	309 27	357 66	
A.D.—474 = B.C. 475 ..	4·8	339 23	274 308	138 165	52 144	52 147	52 177	52 73	67 81	129 207	177 246	
		For each line above this add progress- ively 6·09° omitting fraction.	For each line above this deduct progress- ively 15·32° omitting fraction.	For each line above this add progress- ively 31·85° omitting fraction.	For each line above this add progressively 180°.							
					N.B.—In practice the Venus portion of this table may be dispensed with because there are only two variations one for A.D. 0 and the other for A.D. 474, and these are repeated alternately; also there is no difference between A.D. 474 and A.D. minus 474, between A.D. 948 and A.D. minus 948, etc. The reason is that after 948 years Venus returns to the same M.L., and after 474 years its M.L. is changed by just 180°.							
A.D. 0 = B.C. 1	10·0	333 17	289 323	106 138	232 324	232 327	232 357	232 253	247 261	309 27	357 66	
		For each line below this deduct progress- ively 6·09° omitting fraction.	For each line below this deduct progress- ively 15·32° omitting fraction.	For each line below this deduct progress- ively 31·85° omitting fraction.	For each line below this deduct progressively 180°							
A.D. 474 ..	15·2	327 11	304 338	74 101	52 144	52 147	52 177	52 73	67 81	129 207	177 246	
A.D. 948 ..	20·4	321 5	320 354	42 69	232 324	232 327	232 357	232 253	247 261	309 27	357 66	
A.D. 1422 ..	25·5	315 359	335 9	10 37	52 144	52 147	52 177	52 73	67 81	129 207	177 246	
A.D. 1896 ..	1·2	309 353	350 24	339 6	232 324	232 327	232 357	232 253	247 261	309 27	357 66	
A.D. 2370 ..	6·6	303 347	6 40	307 334	52 144	52 147	52 177	52 73	67 81	129 207	177 246	

We have now to take the last step which should guide us with certainty to the year or years when the horoscope under investigation was realized. All we have to do is to find a line in Table P.F. (pp. 60, 61) coinciding, so far as our planets Mars, Jupiter, Saturn and Venus are concerned, with one of the 13 horizontal lines in our Table Extract O'D'. We notice, for instance, that all the figures under Mars in this table range between 303° and 60°, so that any line in Table P.F. where Mars' increase of longitude does not lie between these limits is of no use for our horoscope. Therefore the 1st line of P.F. which begins with Mars 191° will not suit us. The 2nd line begins with Mars 23° which is within our limits, but the Jupiter of that line is 60° which is nowhere to be found in Table O'D'. side by side with Mars 23°. So we pass over lines 2, 3, 4, etc., of Table P.F. until we come to line 13, where we have Mars 328° and Jupiter 35° both of which are to be found in the last line of Table O'D'. but the figure under Saturn in line 13 of P.F. is 150° which does not lie between 307° and 334°, the entries for Saturn in the last line of O'D'. So we pass over line 13 of P.F. : and equally over the succeeding lines until we come to line 79 in P.F.

where we find Mars 1° Jupiter 237° Saturn 245° Venus 150°, which we have to compare with the line A.D. minus 1896 in O'D'. where we have Mars 357° to 41° Jupiter 228° to 262° Saturn 233° to 260° Venus 232° to 66°. Here Mars, Jupiter and Saturn may suit our horoscope but not Venus. So we continue our search through Table P.F. until we read against 94 years in Table P.F. Mars 352° Jupiter 333° Saturn 69° Venus 288°, with which we compare O'D.A.D. 948 Mars 321° to 5° Jupiter 320° to 354° Saturn 42° to 69° Venus 232° to 66°.

This means (adding the 94 years of Table P.F. to A.D. 948 of O'D') that in A.D. 948 + 94 or A.D. 1042 there was a horoscope of the kind we are in search of and that it was realized between the 20th and 30th completed days of the Indian Solar year (Venus' limits in O'D. A.D. 948, give us this clue). If now we either calculate the corresponding G.P.'s in the usual way with the help of the Planetary Eye-tables or ascertain them direct from Tables V-A and V-B in the larger work, we shall find that the G.P.'s of Mars, Jupiter, Saturn and Venus on the 15th and 30th days of A.D. 1042 were as follows :—

	Mars	Jupiter	Saturn	Venus
On the 15th day (i.e. on Wednesday 7th Ap.A.D. 1042)	300-0°	99-4°	208-7°	329-9°
On the 30th day of the same solar year, i.e., Thursday 22nd April	310-7°	101-0°	207-6°	347-0°

We cannot take a day earlier than the 15th April because then Venus would not have reached Mina, nor can we take a day later than the 15th because then Mars would have passed Makara. So our horoscope with 5 exalted planets Sun, Mars, Jupiter, Saturn and Venus was realized on Wednesday 7th April A.D. 1042.

But what about the 6th planet, the Moon, which we should also like to see exalted in the same horoscope? If we ascertain the Moon's longitude according to the short method explained in para 35 *supra*, p. 7, or direct from the *Ephemeris*, Vol. III (A.D. 1000 to A.D. 1199), p. 86, we shall find that the Moon was exalted, i.e., in Rishabha rāsi, on the 3rd, 4th and 5th days of the Indian Solar year which began in A.D. 1042 and again on the 30th, 31st and 32nd days (i.e., from Friday 26th March to Sunday 28th March, and again from Thursday 22nd April to Saturday 24th April A.D. 1042) but not on the 15th day, Wednesday 7th April A.D. 1042. In the result we conclude that 5 planets, including Mars and excluding the Moon, were exalted on Wednesday 7th April A.D. 1042, and that 5 planets, including the Moon and excluding Mars, were exalted on Thursday 22nd April A.D. 1042, but that all six planets were not exalted simultaneously in this or any other year since 0 Kaliyuga. The case of 5 planets, including the Moon and excluding one of the others, being exalted, is fairly common—See for instance Thursday and Friday 16th and 17th April A.D. 1896, p. 70 *supra*.

We next note, as a likely year, *minus* 474 A.D. *plus* 188 or A.D. *minus* 286, i.e., B.C. 287; this year is commented on in connection with Rāma's horoscope at pp. 120, 122, of *Eph.* Vol. I, Part I; and as there observed, the places of Venus and Mars according to Sūrya Siddhānta were fairly suitable for the horoscope: but according to the *Ephemeris*, all the five planets Sun, Mars, Jupiter, Saturn and Venus were not exalted on any one date in the month of Mēsha, B.C. 287, because Mars did not enter Makara till the 15th day of the solar year and Venus left Mīna and entered Mēsha after the 8th day of the solar year. Lastly the Moon in this year was exalted about the 6th day of the solar year, but on that day Venus was no longer exalted, having left Mīna and entered Mēsha.

Our attention is next drawn to A.D. 1422 + 237; but Table O'D' warns us that in that year Mars' limits were 315° to 359° whereas according to P.F. "237 years," Mars should reach 3° in addition to his M.L. in B.C. 1. We find, in accordance with this warning, that from the 15th to the 17th day of the Indian solar year A.D. 1659, i.e., from Tuesday 12th April to Thursday 14th April, the Moon was in Rishabha and therefore exalted; so were the planets Jupiter, Saturn and Venus, but not Mars which was in Kumbha and not in Makara throughout this month of Mēsha.

We next come upon A.D. *minus* 2370 + 316 or B.C. 2055 and A.D. *minus* 1896 + 316 or B.C. 1581. Neither is exactly a year corresponding to our horoscope, but B.C. 2055 is noted in the *Ephemeris*, Vol. I, Part I, p. 122, as a year which would be suitable according to the Sūrya Siddhānta, though not according to the *Ephemeris*.

A.D. 474 *plus* 331 or A.D. 805 suits Mars, Jupiter and Saturn, not Venus, and therefore as remarked in paragraph 301, p. 122 of *Eph.* Vol. I, Pt. I, it has been commonly accepted as satisfying Sankara's horoscope. This, however, is a fallacy and no particular chronological value attaches to A.D. 805 as the year of Sankara's birth.

A.D. *minus* 474 *plus* 365, i.e., A.D. *minus* 109 or B.C. 110 seems to be within the limits of our Table O'D', but if we calculate the actual G.P. of the several planets, we shall find that Mars was barely within Makara on 0 day of the solar year, his G.P. being throughout the month Mēsha, B.C. 110 in or above 300° . Table O'D' itself shows that in B.C. 110 Venus could not have been within the limits required by us except from the 10th to the 31st day of the month. For these reasons and also because Jupiter by Sūrya Siddhānta would not have reached Karkātaka in Mēsha month, B.C. 110, the latter year is considered unsuitable for Rāma's horoscope—*vide* p. 120 of *Eph.* Vol. I, Part I.

A.D. 2370 + 440 or A.D. 2810 will witness a fairly close fulfilment of a horoscope with five exalted planets—but not closer than A.D. 1042. On the 30th complete day of that solar year the Moon will be exalted, i.e., in Rishabha, since the 1st new moon in the solar year will be due 28-53 days after the commencement of the solar year. On the same day the positions of the planets will be as follows:—

	Mars.	Jupiter	Saturn	Venus	Sun	Moon
A.D. 2810, 30th day	314-3	114-8	211-3	3-2-8	29-10	40°

Mars will have left Makara on the 10th day of the year, and Saturn's G.P. will be a degree and a fraction too much, of which fact we are warned by the limit 334° in O'D', under Saturn, as compared with 336° in Table P.F. "440 years." We have the same kind of horoscope as that discussed in regard to A.D. 1042 *supra* and one not so good either.

Lastly we have A.D. *minus* 1422 *plus* 459 or B.C. 964 which suits Mars, Jupiter and Saturn but, like so many other years, not Venus.

We have now come to the end of our search and have satisfied ourselves that notwithstanding assertions by astrologers to the contrary, there has been only one day since the dawn of Kaliyuga, on which the five planets the Sun, Mars, Jupiter, Saturn and Venus were exalted and that was Wednesday 7th April A.D. 1042. Three early dates B.C. 2292, B.C. 2055 and B.C. 287 come fairly close according to the Sūrya Siddhānta. If they were otherwise likely, we could have accepted them as satisfying our conditions, but they are neither likely nor absolutely correct. We are left with one date in 6,000 years, viz., A.D. 1042, April 7, when five planets were exalted, and none on which six planets were exalted.

The reader who wishes to enjoy the game thoroughly may use, instead of the 500 years' Table P.F., the 2,005 years' Table (V-A) as given in the *Ephemeris*, Vol. I, Part I, pp. 362 to 379. That table gives the increases of longitude of Mars, Jupiter and Saturn for 2,005 years, and the reader can easily add by calculation the columns for Rāhu, Venus and Mercury, or if he wishes it, he can obtain them from the author. He can then use the 1,768 years' cycle which, as will be seen from the extended Table P.F. below, is a more symmetrical cycle and will give results for long periods more expeditiously than the 474 years' cycle. If now the above Table O'D', with 13 lines and 13 multiples of 474 years, be converted into a table of 13 multiples of 1,768 years, the reader will obtain a sweep of $13 \times 1,768 = 22,984$ years instead of 6,000 years as above. He will find that some horoscopes, e.g., the Sūri horoscope in Section IV *supra*, do not occur even once in 22,984 years.

VI. THE PARIPADAL HOROSCOPE.

To the remark made on p. 95 above, that any one exploring ancient Indian literature, for dates through horoscopes, was doomed to failure, there is so far a solitary and unique exception, the *Paripadal* horoscope. In canto XI of the ancient Tamil sangam work known by that name, the poet NALLANTUVANIR avers that he witnessed a South-west monsoon flood in the river Vaigai near Madura on an early morning, shortly before sunrise, when the nakshatra Krittika was high in the heavens, when a lunar eclipse was either in progress or about to commence, and when the other planets were in the following positions: [Briefly, the planets Mars, Jupiter, Mercury and Venus were in their own houses, while Saturn was going to his own house.]

	MARS.	JUPITER.	SATURN.	RAHU.	MERCURY.	VENUS.
(1) Places of the Planets, according to the Paripādā horoscope.	0° to 29°	330° to 359° (Mina).	255° to 270° (latter half of Dhanus and going to Makara).	80° to 100° or 260° to 280° with the Sun or the Moon (Karkātaka or Makara).	60° to 89° (Mithuna).	30° to 59° (Rishabha).
(2) Proceeding, as in problem III, the corresponding mean longitudes about the 90th day of the Indian Solar year, Tab. P.E., pp. 55-59, are	315° to 350°	320° to 350°	260° to 300°	80° to 100° or 260° to 280°	Between 270° and 90	Between 280° and 20°
(3) In B.C. 1, one of the basic years in Table P.D., the mean longitudes of the planets on the 90th day of the Indian Solar year were (Table P.B. or P.D.) ..	301°	171°	73°	287°, Ketu 107°	218°	87°
(4) From (3) to (2) the increases are [except in the case of Rāhu and Ketu, as to which we should reckon decreases from (3) to (2)]	14° to 49°	149° to 179°	187° to 227°	-7° to -27° or -187° to -207°	52° to 232°	193° to 293°
(5) A.D. 17 is the first year to which our attention is directed in Table P.F. where we look for the increases noted in the several columns of line (4).—In A.D. 17 the mean longitudes on 84th day, Āshāḍha Śuk. 15, were	313°	326°	281°	318°, Ketu 138°	44°	306°
(6) We still want for line (2) as compared with A.D. 17, line (5)				-238° to -218° or -58° to -38°		

Line (5) satisfies the requirements of line (2) in regard to Mars, Jupiter, Saturn, Mercury and Venus; for Rāhu we want according to line (4), a decrease of 7° to 27° or of 187° to 207° whereas we get in A.D. 17 a decrease of 80° (or 100°) minus 318° i.e., 122° to 142°. We still want therefore a decrease of -238° to -218°, or of -58° to -38° as compared with the longitude of Rāhu in A.D. 17. We shall, if the horoscope is a possible one, find the decrease required for Rāhu in the following table, which we may call *extended* Table P.F., and which will help us to other similar years when our search in Table P.F. at pp. 60, 61 is only partially successful.

Table P.F. (Extended).—Increase of longitude of planets for various periods. (Sign — means Decrease).

YEARS.	First New Moon in Solar Year.	MARS.	JUPITER.	SATURN.	RAHU.	MERCURY.	VENUS.	YEARS.	First New Moon in Solar Year.	MARS.	JUPITER.	SATURN.	RAHU.	MERCURY.	VENUS.
	Days.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.		Days.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
60	25·7	-36	21	13	-81	46	191	2242	2·6	11	-1	35	-201	13	156
237	17·3	3	-8	16	-268	18	90	2622	27·6	25	11	-2	-357	-59	48
297	13·5	-33	13	29	-349	64	261	2859	15·4	28	3	14	-265	-40	138
378	17·2	-9	-49	-61	-117	179	162	2919	11·6	-8	28	28	-347	5	329
474	5·2	6	-15	32	-176	36	180	3536	24·4	9	28	7	-51	-48	-49
617	12·8	17	4	-21	-64	307	-18	3773	12·2	12	21	23	-319	-20	41
677	9·0	-19	25	-8	-146	-7	173	4627	12·3	32	18	18	-291	-64	113
834	0·6	20	-3	-5	-332	-35	72	5302	14·0	-9	-18	-14	-38	179	196
914	26·3	-16	18	8	-53	11	263	5539	1·9	6	-26	2	-306	197	286
1091	18·0	23	-11	11	-240	-17	162	7070	11·4	-5	-4	-11	-63	155	172
1151	14·1	-13	10	24	-321	29	-7	7307	28·8	-4	-11	5	-331	174	262
1294	21·8	-2	30	-29	-210	-60	156	7546	24·4	24	42	45	-278	301	82
1328	5·8	26	-19	27	-148	2	252	7924	12·1	15	-7	-16	-35	121	244
1531	9·6	1	22	-13	-118	-42	246	8338	8·9	0	11	-8	-89	132	148
1708	1·3	40	-7	-10	-304	-69	144	9075	26·2	3	3	8	-357	150	238
1768	27	4	14	3	-25	-24	-24	16145	8·1	-2	-1	-2	-60	-55	50
1945	18·6	43	-14	6	-212	-51	234	96870	19·3	-12	-4	-12	-358	31	-60
2005	14·8	7	19	-293	-6	66									

The above table supplies a list of possible years, one or more of which, being added to the year in hand (A.D. 17), may give us the exact year, month and day we are in search of. Confining our attention to Rāhu (Col. 6), we find that the only years after A.D. 17 that may satisfy the horoscope are those obtained by an addition of 617 or 1091 years to A.D. 17 unless we wish to try the remote year A.D. 17 + 16145. We decide to try A.D. 617 + 17 or A.D. 634. The first new moon in the solar year A.D. 634 occurred 14·8 days after the commencement of the year; and in such a year by eye-table y (p. 6), Āshāḍha Śuk. 15, which is the full moon we want, would be due on 14·8 + 73·8 = 88·6 days or roughly 89 completed days of the Solar year. The mean longitudes of the different planets on the 89th completed day of the Indian Solar year A.D. 634 were:

A.D. 634.

FIRST NEW MOON IN SOLAR YEAR 14·8 DAYS.

	MARS.	JUPITER.	SATURN.	RAHU.	MERCURY.	VENUS.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
Table P.B. (p. 48), A.D. 600	257·9	11·6	202·0	196·7	305·5	57·2
(pp. 49 to 51) 34 years..	27·8	311·8	55·4	-298·2	61·8	96·4
(Mid) 89 days	46·6	7·4	3·0	-4·3	4·2	142·6
Total	333·3	330·8	260·4	254·2	11·5	290·2
(pp. 55-59) Actual places corresponding to the above mean longitudes	17·7	340	256	254·2	70	42

The last line of figures gives us exactly the horoscope we want. The day in question was Āshāḍha śukla 15 in A.D. 634, i.e., Friday, 17th June A.D. 634, time 5 a.m. In A.D. 1091+17 or 1108 which we considered a year worth trying for the sake of Rāhu, the longitude of Venus on or about 84th day of the solar year would be $80^\circ + 162^\circ$ or 242° ; but if we take into account the first new moon in the solar year A.D. 1108, which was 18 days later than in A.D. 17, we shall find that we do not get in A.D. 1108 a satisfactory longitude for Rāhu, Venus or Mercury, so that A.D. 1108 will not do at all; and failing A.D. 1108, it is hardly likely that another year will be found to satisfy the horoscope, even if we go up to 16145 years or multiples of that period. A.D. 7070+17 or A.D. 7087 looks a likely year, but in that year the first new moon will be later than that in A.D. 17 by 11 days. In A.D. 17 Āshāḍha śukla 15 fell on the 84th completed day of the year. In A.D. 7070+17 it will fall on the 95th completed day, on which the Sun's longitude (Table P.A.) is 91° ; and Rāhu, being then $(318^\circ - 63^\circ)$ or 255° , will be 164° from the Sun, at which distance* a lunar eclipse is impossible. The lunar eclipse test is conclusive and is satisfied only by 17 June A.D. 634.

* Solar and lunar eclipses are determined by Sun's distance from node at new and full moon as follows:—

[Adapted from Prof. Jacobi.] If Sun's distance from node (Rāhu or Ketu) at new moon is

Between 0° and $16\cdot2^\circ$, or between $163\cdot8^\circ$ and 180° , a solar eclipse is	..	..	Certain.
Between $16\cdot3^\circ$ and $18\cdot9^\circ$, or between $163\cdot7^\circ$ and $161\cdot1^\circ$ do. do.	..	..	Doubtful.
Between $19\cdot0^\circ$ and $161\cdot0^\circ$, do. do.	..	..	Impossible.

If Sun's distance from node (Rāhu or Ketu) at full moon is

Between 0° and $10\cdot4^\circ$ or between $169\cdot56^\circ$ and 180° , a lunar eclipse is	..	..	Certain.
Between $10\cdot45^\circ$ and $13\cdot86^\circ$, or between $169\cdot53^\circ$ and $166\cdot14^\circ$ do. do.	..	..	Doubtful.
Between $13\cdot87^\circ$ and $166\cdot13^\circ$, do. do.	..	..	Impossible.

Paripāḍal Horoscope—Short Method.

Section VI about the Paripāḍal horoscope has been inserted in order to illustrate, by means of a concrete example, the difficulties which attend such investigations in practice and also to sift to the bottom the *a priori* view prevalent in certain quarters that Paripāḍal must be held to belong chronologically to the 1st or 2nd century A.D. If we are content, however, to work on the hypothesis advanced in the larger work that it is futile to look in any century before the 6th A.D. for time-records based on planetary positions then we need search for the Paripāḍal horoscope only in years subsequent to A.D. 500 and the result could be reached in a much shorter time. Lines (3), (4) and (5) of the first Table on page 103 will then run as follows:—

	MARS.	JUPITER.	SATURN.	RĀHU.	MERCURY.	VENUS.
(3) A.D. 500, 90th day (Table P.D., pp. 53, 54)	244°	224°	68°	328°	238°	2°
(4) Increases or decreases required	$\dots + 71^\circ$ to $+ 106^\circ$	$+ 96^\circ$ to $+ 126^\circ$	$+ 197^\circ$ to $+ 237^\circ$	$- 228^\circ$ to $- 248^\circ$	$+ 32^\circ$ to $+ 212^\circ$	$+ 278^\circ$ to $+ 18^\circ$
(5) By Table P.F. we have for 134 yrs.	88°	106°	197°	$- 48^\circ$ to $- 68^\circ$ $- 74^\circ$	138°	205°

We see at once that A.D. 634 must give us the horoscope in question and we may satisfy ourselves by proceeding as above that this is so.

Paripāḍal Horoscope—Its non-recurring character demonstrated.

We might next use A.D. 634 as a base year and try and discover whether other years to which Extended Tab. P.F. may lead us from A.D. 634 as a base, e.g., A.D. 634+2622, A.D. 634+9075 or A.D. 634+96870 will suit the horoscope. We shall in each case obtain a negative result as shown below.

The following table may be used, along with the tables for odd years at pp. 34, 35 and 49 to 51 for checking the table on the previous page, i.e., for obtaining additional years for verifying a horoscope.

Increase of longitudes of planets for every 100 or 1,000 years up to 10,000 years.

Examples.

Years.	First New Moon in Solar year.	Mars.	Jupiter.	Saturn.	Rāhu.	Mercury.	Venus.	
	Days.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	
100	3·46	60·52	154·74	141·91	135·83	76·03	198·98	
200	6·92	121·05	309·49	283·82	271·66	152·06	37·97	
300	10·38	181·58	464·23	425·73	407·49	228·09	236·95	
400	13·85	242·10	628·97	587·64	573·32	304·12	75·98	
500	17·31	302·63	793·72	750·55	739·15	380·15	274·92	
600	20·77	3·15	208·46	131·46	94·98	96·18	113·90	
700	24·23	63·68	3·20	273·37	230·81	172·21	312·88	
800	27·69	124·20	157·95	55·28	6·64	248·24	151·88	
900	1·62	184·73	312·69	197·19	142·47	324·27	350·85	
1000	5·09	245·25	477·43	359·10	278·30	40·31	189·83	
2000	10·17	130·50	214·87	318·20	196·80	80·61	19·66	
3000	15·26	15·76	322·30	297·30	114·90	120·92	209·49	
4000	20·34	261·04	69·73	276·40	33·20	161·22	39·32	
5000	25·43	146·27	177·17	255·50	311·50	201·53	229·16	
6000	0·98	31·52	284·60	234·60	229·80	241·83	58·90	
7000	6·07	276·77	32·03	213·70	148·10	282·14	248·82	
8000	11·16	162·02	139·47	192·80	66·40	322·44	73·65	
9000	16·24	47·28	246·90	171·90	344·70	2·75	268·48	
10000	21·33	292·53	354·33	151·00	262·99	43·06	98·31	

Supposing we want to find out accurately the increase or decrease in the longitude of Rāhu for 9075 years and to determine the possibility of a lunar eclipse on Āshāḍha Śu. 15 in A.D. 634 + 9075 or A.D. 9709, we proceed as follows:—

First New Moon in Solar Yr.	Rāhu
Days.	Degrees.
9000 Years.	16·24
75 Years.	9·98
(Eye-Tab. (Tab. P.B. o, p. 34).	11·87
	(p. 51).
9075 Years.	26·22
	356·57

The position of Rāhu on or about Āshāḍha Śu. 15 in A.D. 634 + 9075 or A.D. 9709 will be $(254\cdot2^\circ - 356\cdot57^\circ) = 257\cdot7^\circ$ and that of the Sun $81\cdot7^\circ$ (How?). Distance of the Sun from Rāhu will be $176\cdot0^\circ$ and a lunar eclipse at that time will be possible; but Mercury will be out of place, A.D. 634 + 2622, may again suit Rāhu but not Mars. In A.D. 634 + 96870 Venus fails and eclipse is doubtful.

The same result, namely, that the Paripāḍal horoscope is a non-recurring data may be established so as to secure absolute conviction, by employing the General Method O.D. and O.D'. expounded on pp. 97 to 103.

VII. INVESTIGATION OF RAJAYOGA HOROSCOPES.

To the student who has taken any interest in the problems so far examined it will have become obvious that the fuller a horoscope is, the less chance there is of its occurring more than once in the course of several thousand years. This proposition which may be enunciated more briefly in the form "*one horoscope, one date*," is of great value in the investigation of such chronological horoscopes as we happen to possess in Indian literature: but it will come as a surprise to students of astrology that the same cogent test is applicable to the horoscopes which are constantly adduced by astrological writers in order to illustrate and enforce their canons of planetary influence. When for instance we are told in VARAHAMIHIRA'S *Bṛihatjātaka* (1) that royal personages are born under certain planetary combinations, (2) that under other combinations a person attains longevity without limit, or again, (3) that *Vajra* yoga takes place when benefic planets (Jupiter, Venus, Full Moon, Mercury associated with benefics) are in the Ascendant (lagna) or in the Descendant (6 houses from lagna), and malefics (Sun, New Moon, Mars, Saturn, Mercury in company with malefics) are in the 4th and 10th houses and no planets elsewhere,—we are apt to imagine, (1) that some one or other of the *rājayoga* combinations must mark the birth of every person destined to rule over his fellow-men, (2) that horoscopes of unlimited longevity can occur almost never and (3) that many people cannot be as lucky as they are unless they were born under a *vajra* yoga. We shall find on investigation, however, that every one of these horoscopes is, at most, a single date and therefore cannot be a rule applicable to several dates. We shall devote some space to a thorough and detailed examination of certain of these so-called rules.

Bṛihatjātaka, Ch. XI. Rājayoga, Verse 3.

3. "If the Lagna or the Moon be in Vargottama and if either of them be at the same time aspected by 4, 5 or 6 planets excepting the Moon, then 22 cases arise of Rājayoga (or 44 if both the lagna and the Moon are considered)."

We take first the cases where the Moon is in Vargottama (1st Navamsa of Vṛisha) and secondly the cases where the lagna is in Vargottama and either is aspected by 6 other planets (Mars in 4th or 8th house, Jupiter in 5th or 9th house, Saturn in 3rd or 10th house, Mercury, Venus and Sun each in 7th house). Sixteen cases arise, to each of which only one equivalent horoscope can be found and that horoscope, so far from being a rule, is a non-recurring date.

[The numerals are the numbers of houses or *bhavas*.]

MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON.
5 Simha	.. 6 Kanyā	.. 4 Kāṭaka	.. 8 Vṛiśchika	.. 8 Vṛiśchika	.. 8 Vṛiśchika	.. 2 Rishabha.
5 "	.. 10 Makara	.. 4 "	.. 8 "	.. 8 "	.. 8 "	.. 2 "
5 "	.. 6 Kanyā	.. 11 Kumbha	.. 8 "	.. 8 "	.. 8 "	.. 2 "
5 "	.. 10 Makara	.. 11 "	.. 8 "	.. 8 "	.. 8 "	.. 2 "
9 Dhanus	.. 6 Kanyā	.. 4 Kāṭaka	.. 8 "	.. 8 "	.. 8 "	.. 2 "
9 "	.. 10 Makara	.. 4 "	.. 8 "	.. 8 "	.. 8 "	.. 2 "
9 "	.. 6 Kanyā	.. 11 Kumbha	.. 8 "	.. 8 "	.. 8 "	.. 2 "
9 "	.. 10 Makara	.. 11 "	.. 8 "	.. 8 "	.. 8 "	.. 2 "
4 "	.. 5 "	.. 3 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
4 "	.. 9 "	.. 3 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
4 "	.. 5 "	.. 10 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
4 "	.. 9 "	.. 10 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
8 "	.. 5 "	.. 3 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
8 "	.. 9 "	.. 3 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
8 "	.. 5 "	.. 10 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)
8 "	.. 9 "	.. 10 "	.. 7 "	.. 7 "	.. 7 "	.. Lagna (1)

Rājayoga, Verse 4 (Bṛihat. Ch. XI).

"Saturn in Kumbha, Sun in Mēsha, Moon in Vṛisha and one of these three being in Lagna, Mercury in Mithuna, Jupiter in Simha, Mars in Vṛiśchika, three cases of Rājayoga arise."

None of these cases is possible since Mercury cannot be in Mithuna when the Sun is in Mēsha. We therefore dismiss these cases which cannot occur in practice, and consider the second part of Verse 4 which is rendered thus:—"Saturn and Moon being exalted (i.e., in Tula and Vṛisha respectively) and one of these being in Lagna, Sun and Mercury in Kanyā, Venus in Tula, Mars in Mēsha, Jupiter in Karka, two cases of Rājayoga arise." For our purposes there will only be one case, because on any date which answers to the given horoscope, the Moon in Vṛisha will be in lagna at some part of the day or night and Saturn in Tula will be in lagna at another part. The case is—

MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON.
Mēsha	Kāṭaka	Tula	Kanyā	Tula	Kanyā	Rishabha
B.C. 2495, 174th day	.. 344-6°	100-3°	202°	152-4°	180-6°	167-5°

The case is possible as the date shows; but it can only occur on a single day in the course of several thousand years. On the 174th completed day of the year 2495 B.C. the positions of the planets were as indicated above. Mars' actual place was 344-6°, to which 10° should be added for *śūrya* *siddhānta* (Table III on p. 48), but Mars would even then be only 355° or 5° short of Mēsha. Still, considering the positions of the other planets, this date may be considered fairly suitable: at any rate we cannot find anything better for several thousand years. The more tedious the search, the more we are convinced that the horoscope is a date which might be a record but which cannot be a rule. It cannot be a record either because nothing is recorded of this date. The student may profitably apply to this case the General Method O.D. and O'D. expounded at pp. 97 to 103 *supra*.

Bṛihatjātaka, Ch. XI. Rājayoga, Verse 7.

We come next to Verse 7. We shall take first the second part of the verse of which the translation runs thus:—"Kanya being lagna and Mercury in it, Saturn and Mars in Makara, Jupiter, Moon and Venus in Dhanus."

If Venus is in Dhanus (240° to 269°) and Mercury in Kanya (150° to 179°), either of the two planets would be too far from the Sun except on or about the 200th day of the Indian Solar Year, and if we look at the Venus eye-table (p. 58) we shall find that that planet does not attain 240 degrees even on the 190th day of the Solar Year. We might try B.C. 366, B.C. 306, A.D. 312, but none of these dates suits exactly because of the difficulty of getting a date exactly on the 200th day of the Indian Solar Year. We may satisfy ourselves, by the General Method illustrated on pp. 97 to 103, that for 20,000 years past no king was ever born under this horoscope and that none will be born under it for as many thousands of years to come.

The first part of the same Verse 7 is rendered thus:—"Jupiter in Dhanus, and Moon in it, Mars in first half of Makara, Mercury or Venus being exalted in its own house, two cases of Rājayoga arise, one when Mina is lagna, one when Kanya is lagna."

The Sun and Saturn do not enter into this combination ; but as the Sun and Saturn must be somewhere in a horoscope, there are 60 cases corresponding to Saturn's occupying of each of the several possible signs at a time when Venus is exalted in Mīna, and 36 other cases when Mercury is exalted in Kanyā, altogether 96 cases, to each of which we can append a date so conditioned that it cannot recur in the course of several thousand years. The student will find it a useful exercise to try and find a few of the dates

Bṛihatjātaka, Ch. XI. Rājyoga, Verse 11.

"Mercury in lagna Kanyā, Venus in Mithuna, Jupiter and Moon in Mīna, Saturn and Mars in Makara, a person becomes a king."

In this case we are in a position to adduce satisfactory, nay conclusive, proof, that such horoscopes can occur only once in several thousand years. First of all we arrive, by means of either the General method, or that illustrated above in the case of the Rāmāyāna and Paripāḍal horoscopes at the year Kaliyuga 1647 (= B.C. 1455) which is fairly near the mark ; but in that year Mercury was out of place. Table P.F. (extended), p. 103, enables us to get over this difficulty, for if we advance 16145 years from R.C. 1455, we shall get the horoscope we want, viz.—

MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON.
272°2'	330°8'	281°7'	161°4'	88°0'	126°0'	342°

But we have to wait till A.D. 14691 for the realization of the horoscope ! "Till that year is reached" one might well ask, "what is the use of this as well as of many similar rules, or rather dates, embedded fossilwise in Bṛihatjātaka since the 6th cent. A.D.?"

Bṛihatjātaka, Ch. XI. Verse 13.

Translation (according to Panini Office Edition) :—"When 5, 6, or 7 planets are exalted," Note.—Only 6 planets can be exalted at a time, because Mercury's exaltation in Kanyā cannot take place simultaneously with Sun's exaltation in Mēsha. The fault is not Varāhamihira's who only says "5 planets or more," meaning "5 or 6," whereas the translator has improved upon it by saying "5, 6, or 7." The case of 5 planets in exaltation is that of Rāma's horoscope. There is no instance since the dawn of Kaliyuga of six planets (Sun, Moon, Mars, Venus, Jupiter, Saturn) in exaltation. The whole case has been worked out already in great detail at pp. 97 to 103 *supra*.

Bṛihatjātaka, Ch. XI. Rājyoga, Verse 15.

"Venus in its own house (Vṛisha or Tula), and in 4th house from lagna : the Moon in 9th house : other planets, Sun, Mars, Mercury, Jupiter and Saturn in 1st, 3rd and 11th houses."

There are two sets of cases one corresponding to Kumbha lagna, in which case Venus would be in its own house (Rishabha which would then be the 4th from lagna) and the other corresponding to Katakā lagna, from which Tula, also Venus' own house would be the 4th.

[The numerals refer, as before, to the houses or bhāvas.]

	MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON
Kumbha lagna	3 Mēsha 1 Kumbha 11 Dhanus	3 Mēsha .. 1 Kumbha .. 11 Dhanus ..	3 Mēsha .. 1 Kumbha .. 11 Dhanus ..	3 Mēsha .. (1 Kumbha) .. (11 Dhanus) ..	4 Vṛisha ..	3 Mēsha .. (1 Kumbha) .. (11 Dhanus) ..	9 Tula
Katakā lagna ..	3 Kanyā 1 Katakā 11 Vṛisha	3 Kanyā .. 1 Katakā .. 11 Vṛisha ..	3 Kanyā .. 1 Katakā .. 11 Vṛisha ..	1 Katakā .. 3 Kanyā .. (11 Vṛisha) ..	4 Tula ..	3 Kanyā .. (1 Katakā) .. (11 Vṛisha) ..	9 Mīna

Some of these positions, namely, those enclosed in small brackets, are impossible, because of the astronomical conditions which govern the relative positions of Sun, Venus and Mercury. The possible positions may be combined so as to make 27 different horoscopes with Kumbha lagna and 108 horoscopes with Katakā lagna. To each of these horoscopes there can correspond but one date, and not more than one date in the course of several thousand years. None of these horoscopes, much less all of them together, can serve as a rule for the guidance of astrologers and their clients.

Bṛihatjātaka, Ch. XI. Rājyoga, Verse 16.

"Mercury becoming strong and occupying lagna, a benefic planet, Venus or Jupiter being also strong and occupying the 9th sign, and the other planets occupying as far as possible the 9th, 2nd, 3rd, 6th, 10th and 11th houses, princes become virtuous rulers of the earth."

No horoscope is possible with Mercury in the 1st house and Venus in the 9th ; because, if the Sun were in the 12th house so as to make Mercury's presence in lagna possible, Venus in 9th house would be too remote from the Sun. There remain the following possibilities sc.

MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON.
2, 3, 6, 9, 10, 11.	9	2, 3, 6, 9, 10, 11.	Strong Mercury (1)	2, 3, (6), (9, 10, 11).	2, (3) (6), (9, 10, 11).	2, 3, 6, 9, 10, 11.

If Mercury is in the 1st house, the Sun cannot be in any other house than the 2nd and Venus could not be further than the 3rd. The number of possible horoscopes is $6 \times 1 \times 6 \times 2 \times 1 \times 6 = 432$. Each of these horoscopes can at most correspond to one date in the course of several thousand years. Again the horoscopes in question can be interpreted only as so many dates and they can not be combined into a rule.

Bṛihatjātaka, Ch. XI. Rājyoga, Verse 17 (1).

"The ascendant Vṛisha with the Moon, Jupiter in Mithuna, Saturn in Tula, Sun, Mars, Mercury and Venus in Mīna, make princes kings."

	MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON.
B.C. 1760 335th completed day (S. Sid)	Mīna 350°	Mithuna 96°	Tula 210°	Mīna 330°	Mīna 238°	Mīna 330°	Vṛisha (L.) 54°

This is a perfectly possible horoscope, but there can only be one date corresponding to it in the course of several thousand years. In fact, B.C. 1760, 335th solar day satisfies the horoscope according to Sūrya siddhānta. It may have been the date of a king's birth somewhere in Jai Bhudvipa, but no one can evolve a rule out of a date, and the date itself is not recorded elsewhere ; any way this shrouded *ipse dixit* of a 6th cent. astrologer cannot be construed seriously as a record.

Bṛihatjātaka, Ch. XI. Rājyoga, Verse 17 (2).

"Saturn in lagna, Jupiter in the 4th house, Sun and Moon in 10th house, Mars Mercury and Venus in 11th house, make princes kings."

The commentator remarks that Saturn may be in any one of the 12 houses, provided it is lagna. Assuming that Saturn is in Mēsha as lagna, we have the following horoscope :—

MARS.	JUPITER.	SATURN.	MERCURY.	VENUS.	SUN.	MOON.
Kumbha.	Katakā.	Mēsha (L.)	Kumbha.	Kumbha.	Makara.	Makara.

If we shift Saturn from Mēsha to Rishabha, every other planet will be shifted to the next house and there will be another possible horoscope. This shifting may be continued through all the twelve houses. But the point to be noted is that there are only 12 possible variations of the horoscope and twelve dates, not a rule.

Bṛihatjātaka, Ch. XI. Rājyoga, Verse 18 (1).

"The Moon in the 10th house, Saturn in the 11th house, Jupiter in lagna, Mercury and Mars in the 2nd house, Venus and Sun in 4th house, make princes kings." This is not a possible horoscope, since Mercury cannot be separated from the Sun by an interval of two houses.

"Mars and Saturn in 12th, Moon in 4th house, Jupiter in 7th house, Venus in 9th house, Sun in 10th, Mercury in 11th house makes princes kings." Here again Saturn may, as in Verse 17 (2), be in any sign and there are twelve possible horoscopes under this rule, but dates exhaust the rule, which having been thus expended can be of no further use to anybody.

N.B.—If Mars and Saturn are in Mēsha as lagna the horoscope is satisfied by B.C. 2186, 304th day, except for Moon. Dates can be found for other positions of lagna by the General Method O.D. pp. 97 to 102.

VIII. INVESTIGATION OF HOROSCOPES OF LONGEVITY (AYURDAYA).

Varāhamihira says: "Guru śaśi sahita kuḥra lagna, śaśtanaye bhṛigujecha kendrayate ||

Bhavaripu sahaja upagaścha śeshaiḥ, amitaṁhi āyuh anukramātvināsyit || *Bṛihatjātaka, Chapter VII, Ayurdaya, v. 14.*

Jupiter and Moon in Kataka Lagna, Venus and Mercury in Kendra (Houses 1, 4, 7, 10), Sun, Mars and Saturn in 11th, 6th and 8rd houses, i.e., two or all of them in any of such houses or each in one house: in any of these cases no calculation of length of life can be made for such lives far exceed in length the normal."

The following is a list of 45 possible cases under this rule, after excluding the impossible ones, e.g., those where Venus or Mercury would be beyond their maximum distances from the Sun. In cases 3, 5, 13, 21, 23, 26, 30, 37, 42, 45, Mercury, Sun and Venus have to be nearly in the following positions, 29 degrees, 49 degrees and 90 degrees respectively because if the Sun were less than 49 degrees, Venus would be too far and if the Sun were more than 49 degrees, Mercury would be too far. In case 2, 7, 9, 15, 17, 28, 33, 35, 40, Venus, Sun and Mercury must, for the reasons just adduced, be placed as nearly as possible in 119 degrees, 160 degrees and 150 degrees respectively.

LONGITUDE AT COMMENCEMENT OF EACH SIGN SUITABLE FOR HOROSCOPE IN BṚIHATJĀTAKA VII, 14.

	MARS.	MERCY.	JUP.	VENUS	SATURN	SUN	MOON		MARS.	MERCY.	JUP.	VENUS	SATURN	SUN	MOON
1	150	180	90	180	150	150	90	24	150	270	90	270	150	240	90
2	..	180	90	90	..	..	90	25	150	0	90	0	150	30	90
3	240	270	90	270	240	240	90	26	..	0	90	90	..	..	90
4	30	0	90	0	30	30	90	27	240	180	90	180	240	150	90
5	..	0	90	90	..	..	..	28	..	180	90	90	..	..	90
6	150	180	90	180	240	150	90	29	240	0	90	0	240	30	90
7	..	180	90	90	..	..	90	30	..	0	90	90	..	..	90
8	150	180	90	180	30	150	90	31	30	270	90	270	30	240	90
9	..	180	90	90	..	..	90	32	30	180	90	180	30	150	90
10	240	270	90	270	150	240	90	33	..	180	90	90	..	..	90
11	..	270	90	270	30	..	90	34	240	180	90	180	30	150	90
12	30	0	90	0	150	30	90	35	..	180	90	90	..	..	90
13	..	0	90	90	..	..	90	36	150	0	90	0	240	30	90
14	240	180	90	180	150	150	90	37	..	0	90	90	..	..	90
15	..	180	90	90	..	..	90	38	150	270	90	270	30	240	90
16	30	180	90	180	150	150	90	39	30	180	90	180	240	150	90
17	..	180	90	90	..	..	90	40	..	180	90	90	..	..	90
18	150	270	90	270	240	240	90	41	240	0	90	0	150	30	90
19	30	270	90	270	240	240	90	42	..	0	90	90	..	..	90
20	150	0	90	0	30	30	90	43	30	270	90	270	150	240	90
21	..	0	90	90	..	..	90	44	30	0	90	0	240	30	90
22	240	0	90	0	30	30	90	45	30	0	90	90	..	..	90
23	..	0	90	90	..	..	90								

This is a typical illustration of the considerations arising out of the application of astronomical tests to astrology. In the first place, Varāhamihira lays down a rule that a horoscope containing seven planets in certain positions corresponds to a life of which the length cannot be measured. There are 45 possible cases under the rule for each of which a date can be found, either in the remote past or in the remote future (there seem to be no such cases during the last 300 years); but probably not more than one date in several thousands of years. At first sight it would appear that this is what one might expect, because Varāhamihira himself warns us that such cases must, by their very nature, be of rare occurrence. But the occurrence of even 45 actual cases, though in times separated from one another by long intervals, is not warranted by the nature of the rule. To give two examples, case No. 1 will be found to have occurred on the 183rd day of the Solar year B.C. 2116 when the positions of the 7 planets were 188° 3', 192° 0', 90°, 202°, 162°, 175° and 91° respectively. Horoscope No. 43 was nearly fulfilled on the 256th day of B.C. 3020, when Mercury was about 20 degrees, i.e., 5 days short, and the other planets were in the required positions. At the risk of making the same observation over and over again *ad nauseam*, we are driven to conclude that all kinds of horoscopes, whether astrologically rare, not rare or quite common, present the same difficulties in regard to recurrence whenever six or seven planets occupying certain relative positions have to be located in time. In other words the supposed frequency or the reverse of astrological phenomena does not satisfy astronomical, any more than it satisfies statistical, tests. [See X (4) and (5) on page 108 below.]

IX. BṚIHATJĀTAKA, CH. XII. THE NABHASA AND SAMKHYA YOGAS OR SEVEN PLANET HOROSCOPES GENERALLY.

All the Nabhasa Yogas in Ch. XII of Bṛihatjātaka are capable of astronomical identification. It will be seen from any classified list of nabhasa yogas that all of them can be reduced to the form of 7 planet horoscopes and in that form can be equated each to a single non-recurring date so that every one of the 32 million yogas alluded to in that chapter is useless except possibly to aver the astrological benefits or mischiefs of the particular date, ascertainable but as yet unascertained, to which that particular yoga relates. If we catalogue these yogas by the lagna, we shall have $32 \times 12 = 45$ million horoscopes. And this is the absolute total of all possible horoscopes, each with a lagna and 7 planets, and the total roughly corresponds to the population of the Madras Presidency. We are apt to imagine that, equally roughly, each one of the horoscopes may belong to some individual now living in the Madras Presidency. This would be a serious error, because the 45 million horoscopes cannot, as we have seen from several examples, be exhausted unless we travel over more than 20,000 years. Each horoscope is a date and there are roughly 180 possible horoscopes in a year without reckoning lagna. The total of possible horoscopes with seven planets each is exactly $12^7 \times 15$, because the total number of (algebraically) possible horoscopes with Sun, Mars, Jupiter, Saturn and Moon planets each is exactly 15, because the total number of (algebraically) possible horoscopes with Venus and 3 on account of Mercury, so that the total number of possible seven planet horoscopes is $248,832 \times 15 = 3,732,480$ or roughly 3½ millions. If we take 174 as the average number of (seven planet) horoscopes in a year (which can be verified from Table V-B in the *Ephemeris*, Vol. I, Part I), we shall have exhausted 3,732,480 horoscopes in 21,566 years, but there are some horoscopes, like the Suri horoscope on p. 96 *supra* which do not occur even once in the course of 25,000 years.

X. INVESTIGATION OF HOROSCOPES CONTAINING 2, 3, or 4 GROUPED PLANETS.

We may next examine a few cases from Varāhamihira where the groups of collocated planets are smaller in number than 7, and where in consequence it is easier to apply astronomical tests :

(1) "If at the time of birth of a person, one of the two houses, the 12th and the 6th from the ascendant, be occupied by the Sun and the other by the Moon, the person and his wife will have each a single eye." When the distance between the Sun and the Moon is six houses or 180, the Moon must be full. Any one born at full moon when the full moon tithi is completed either two hours after sunrise or two hours after sunset would have his lagna in the position contemplated by this rule. It would therefore be easy to determine beforehand the day and hour when this rule would operate.

(2) "If at the time of birth the Moon occupy the ascendant, Saturn and Mars occupy the 12th and 2nd houses and the Sun the 7th house, the person will be afflicted with white leprosy." The rule applies to any person born when the full moon rises, provided Saturn is about 30 degrees to the west of the Moon and Mars is about 30 degrees to the east. Any child born at or about moonrise on Saturday 3rd April 1920 must have been born under such conditions : for at that time the full moon was in lagna, 174 degrees, Sun 180° from it or in the 7th house, Mars 192.6 degrees or in second house from lagna and Saturn 135° or in 12th house from lagna. Many similar dates in other years may be traced with the help of the *Ephemeris*.

(3) "If at the time of birth of a person, the Moon occupy a place between Saturn and Mars and the Sun occupy the sign Capricorn, such person will be afflicted with asthma, consumption and diseases of the spleen." The Sun in Capricorn or Makara month means, at the present time, between 13th January and 12th February. The Moon was in such position, as will be seen from the *Ephemeris*, every day from January 28th to 8th February A.D. 1921 and in every month of January—February in each year there must be such days.

(4) "If at the time of birth the eclipsed Sun occupy the rising sign and if Saturn and Mars occupy the 5th and 9th house from the ascendant, the person will lose his eyes. The reference is to persons born during a solar eclipse when the Sun is rising in an eclipsed condition. The Sun rose last in an eclipsed condition on Sunday 30th July A.D. 1916, but Saturn and Mars were not in the positions indicated in this rule. In fact, although there were 15 eclipses in the course of the last century, at which the Sun rose in an eclipsed condition, Mars and Saturn were not in the positions here indicated except on *Monday, 10th November A.D. 1817*, when the Sun's longitude was 208°, Mars longitude was 63.5°, i.e., in 9th house to the east, and Saturn's longitude was 306° or in 5th house to the east. Many children must have been born in the Madras Presidency about sunrise on 10th November A.D. 1817, because the number of children born in that Presidency every hour is 140 : but it is to be feared that subsequent censuses did not confirm the indications of astrology that all or most of the persons born at such a time became blind.

(5) "If at the time of birth Mars occupy the 7th house and Jupiter the ascendant, the person will become insane." Mars has only to be 180° from Jupiter in lagna for this consequence to follow. It will be seen from the *Ephemeris* that from 26th December 1920 to March 14, 1921, Mars was in the 7th house from Jupiter. The same was the case from April 8 to May 3, 1923, and such cases will be found to recur about once in two years. As children are born in the Madras Presidency at the rate of 140 per hour and therefore all in the same lagna, it is obvious that this periodical outburst of insanity among persons of the same age cannot be supported by statistics.

XI. CONCLUSION.

Horoscopes in Indian literature fall into four classes which it is very important for the chronologist and the research-worker to be able to distinguish :—

(1) **Actual genuine horoscopes**, like the *Paripādāl* horoscope, which can be completely verified. Such horoscopes are *very rare*, and the author would like to hear of other horoscopes between the 7th and the 15th century A.D. He will be glad to verify them for correspondents.

The horoscopes of Viśvanātha and Narahari on p. 98 *supra* are types of the chronological horoscopes which the author would like to secure for calculation and future publication.

(2) **Imaginary horoscopes**, like Rāma's and probably Sankara's, which may, occasionally, and as an astronomical pastime, or by way of a useful scholastic exercise, be equated to a date or dates, but which cannot, by any stretch of the imagination be construed as genuine time-records. In other cases, as in that of the Suri horoscope on p. 96 *supra*, such horoscopes cannot be equated to any date in times historic or even legendary, and then they lie wholly outside the realm of actuality. A result of this kind might be described in mathematical languages as *real but irrational*, though it may not, in a mathematical sense, be imaginary. Where, as in Rāma's horoscope, the number of planets to be located in the horoscope does not exceed six (including the Sun and the Moon), and *a fortiori* where, as in Sankara's horoscope, it does not exceed five, a number of solutions can be found with the aid of Extended Table P.F. (pp. 60, 61) : and among such solutions there may be several in Yugas preceding the Kaliyuga, which would no doubt better suit the fancies of those who are not content to place Rāma's or Sankara's birth in Kaliyuga. See p. 102 *supra*.

(3) **Impossible horoscopes**, where one or more of the conditions imposed by celestial mechanics are ignored by the astrologer. A horoscope in which Mercury is placed more than 26° or Venus more than 48° from the Sun is an impossible horoscope. The ancient commentator on the still more ancient *Paripādāl* blundered in this way, placing the Sun of the *Paripādāl* horoscope in Simha (120° or -above), while Mercury was in Mithuna (60° to 89°) and Venus in Rishabha (30° to 59°). Fortunately, the horoscope itself, as recorded by the poet, is not impossible ; and it is in fact a most valuable landmark for the chronology of Tamil literature. See pp. 102—104 *supra*.

The place of honour, among a legion of astrological delusions, belongs to the *Mahābhārata* statement that Mars was retrograde in the Maghās (*Maghās āṅgārako rakṛtā*) in the month in which the great battle was fought. If that month was Kārtika or Mārgaśīra, which is the prevalent opinion of commentators, then it was impossible for Mars to retrograde in the Maghā nakṣatra. The proof of it is astronomy and the Perpetual Planetary Almanac, pp. 382 to 437 of *Indian Eph.* Vol. I, pt. I), showing that Mars can never be in that position in such a month.

(4) If we apply astronomical tests to the thousands of horoscopes which are introduced as examples into text-books of astrology, we shall find that, although the horoscopes with five, six or seven planets were intended to represent types of more or less frequent occurrence, yet they in fact correspond to single dates and to not more than one date each in several thousands of years. We cannot make use of them as dates because they were not present as such to the astrologer's mind ; nor will they serve us as illustrations, because they are practically incapable of recurring. Equally noteworthy is the result of applying the astronomical criterion to the smaller groups of planets in horoscopes which are supposed to indicate blindness, deafness, leprosy, insanity, i.e. all the mishaps which the census tables collectively designate as infirmities. Here also astrology commits itself unwittingly to dates of an inconvenient kind ; inconvenient because the dates are a challenge to recorded statistics of infirmities, and whatever may be thought of the merits of astrology the challenge has to be reckoned with. Lastly we may take the fairly common case of three exalted planets which are supposed to prognosticate success in any walk of life. Such cases must necessarily occur once in 60 years whenever Saturn and Jupiter are exalted simultaneously : the Moon is exalted on one or two days in a month whenever she is in Rishabha (30° to 59°) and this must happen in a series of months in succession when Jupiter and Saturn are both exalted. Mars and Saturn are together exalted generally once in 30 years, and the Moon also would occasionally be exalted at such times. All such occasions can be calculated beforehand without any difficulty by means of the present method, and they would seem to be more or less rhythmical in their recurrence ; but even in astrology there is no warrant for the hypothesis that the heavens rain success in this fashion over all mankind or over the whole of a country like India, at stated times and inflict a universal drought of misfortune on humanity at other times,

XII. ADDENDUM TO SECTION V (pp. 98—102). The 237 Years' Cycle.

A

For the purposes of ordinary chronological investigation a 237 years' cycle (one-half of a cycle of 474 years) is both convenient and sufficient and then Tables P. F. and O'. D'. may be reduced to their narrowest dimensions. For example the following Table O'. D'. is enough for arriving at the determination of the *Buddhavidyotini* horoscope referred to on p. 33 :—

Horoscope : SIMHA LAGNA. MARS in Makara; JUPITER in Mina; SATURN in Kumbha; VENUS in Mina, MERCURY in Mithuna, MOON (or Sun) in eclipse. NAKSHATRA HASTA-CHITRA.

Table O. D.

0 to 31 days A. D. of Solar Year.														0 to 31 days A. D. of Solar Year.													
1st N. M. in S. Year.				MARS. 270° to 300°		JUPITER. 330° to 360°		SATURN. 300° to 330°		RAHU. 180° to 210°		RAHU. 0° to 30°		1st N. M. in S. Year.				MARS. 270° to 300°		JUPITER. 330° to 360°		SATURN. 300° to 330°		RAHU. 180° to 210°		RAHU. 0° to 30°	
0	10-0	333	17	157	193	232	265	82	112	262	292	1185	8-2	318	2	195	231	152	185	182	212	2	32				
237	27-4	330	14	165	201	216	249	174	204	354	24a	1422	25-6	315	359	203	239	136	169	274	301	94	124				
474	15-2	327	11	172	208	200	233	266	296	86	116b	1659	13-4	312	356	211	247	120	153	6	36	186	216				
711	3-0	324	8	180	216	184	217	358	28	178	208	1896	1-2	309	353	218	255	104	137	98	128	278	308				
948	20-4	321	5	188	224	168	201	90	120	270	300c																

(a) + 77; Rāhu 51.

(b) + 77; Rāhu 51.

(c) + 220; 349, 196, 168, 299. Right.

It is easy to construct Table O'. D'. for cycles of 237 years each, because the movements of the planets for that period are : Mars, +3-045°; Jupiter, -7-66°; Saturn, + 15-92°; Rāhu, -267-92°. Consequently in advancing from A. D. 0 to A. D. 1896 between which limits our horoscope, if genuine, must lie, we reverse the signs for Mars, Jupiter and Saturn and retain the sign for Rāhu. We find only one year suitable, viz., A. D. 948+220 or A. D. 1168, and the lunar eclipse in that year occurred on Monday 25th March about 9 a.m. when Simha was lagna and the nakshatra was Chitra. Neither Venus nor Mercury was then in the position required by the horoscope; in fact Mercury cannot be in Mithuna when the Sun is in Mēsha, though the idea was very generally entertained at one time in India that it could be; but in such investigations the correctness of the result is not impaired by the fact that there are superfluous data which are erroneous.

B

The 237 years' cycle may be used with advantage, as shown on the next page, for demonstrating that a particular combination mentioned in astrology has occurred either once or not at all during several thousand years. Table O'. D'. may have to be some 50 lines long for a period of 12,000 years; but it is easily made up in stages of 237 years, as the successive additions, or deductions are simple. For years before O. A. D. we add at every stage 3° for Mars (4° every 20th stage to make up for the decimals omitted in 3-045°); we deduct 8°, 7°, 8° successively for Jupiter (to make up for the decimals in -7-66°); we add 16° at every stage (15° every twelfth stage) for Saturn; and 18° at every stage (except every 5th stage for which we add 19°) for Mercury. For Venus we need have only 4 lines in all, just as we needed only 2 lines for Venus when we used the 474 years' cycle (see N. B. on p. 101, *Panchang and Horoscope*). We reverse these signs for cycles subsequent to O. A. D.

For Mars we may require occasionally a full table O. D. similar to that at p. 99 for Venus and Mercury. The reason for this is because occasionally the limits fixed for Mars in the table on p. 98 (e.g., the limits in Mēsha month, 64° to 144°, 109° to 190° and 158° to 231°) may prove to be too wide for close working. The Expanded Table O. D. for Mars in Section C below is framed in a simple and direct manner; for instance, the two limits in that table for Mars in Mēsha on 0 day and the two for Mars in Mēsha on 31st day, viz., 98°, 144°, 64° and 109° are taken bodily from col. 3 of the table on p. 97 and the other quantities in the Expanded Table O. D. for Mars are arrived at in the same manner.

C

(Expanded) Table O. D. for Mars—Additions to Mean Longitude of Mars in A. D. 0 (= B. C. 1), etc.—vide p. 99.

Day of Solar Year.	0°	30°	60°	90	120	150°	180	210°	240°	270	300	330	Day of Solar Year.	0°	30°	60°	90	120°	150°	180°	210°	240°	270°	300°	330.										
DAYS.													DAYS.																						
0	98	144	190	231	260	279	294	306	322	344	7	55	190	2	11	23	45	84	136	192	243	287	319	340	352										
10	87	133	181	225	259	281	295	307	320	340	9	45	200	2	11	22	42	76	125	180	232	272	313	338	350										
20	77	122	171	219	256	281	296	308	320	336	1	36	217	3	13	23	39	67	108	160	213	260	299	330	352										
30	64	109	158	209	251	280	297	309	319	333	355	24	220	2	12	23	38	64	105	156	209	256	296	328	349										
40	51	98	148	200	246	279	298	310	320	332	350	17	230	2	13	24	37	60	97	145	197	245	287	322	347										
50	45	87	137	189	239	276	298	311	321	341	346	11	246	0	14	25	37	56	86	129	178	226	271	308	339										
62	34	74	124	176	229	271	296	311	322	331	343	3	250	359	14	25	38	56	84	125	174	222	266	305	337										
70	27	66	114	167	221	267	297	312	323	332	342	359	260	357	14	27	39	56	80	117	163	211	256	296	331										
80	19	55	101	154	210	259	293	312	323	331	341	355	278	351	13	28	42	58	78	107	148	193	238	280	318										
94	10	42	86	138	195	248	287	310	323	332	340	352	280	349	13	29	43	58	77	105	145	189	234	276	315										
100	7	37	79	130	187	242	284	310	324	333	341	351	290	341	10	29	43	58	77	101	135	178	222	264	305										
110	5	30	70	120	176	232	278	309	325	334	342	352	305	330	5	29	46	63	79	99	126	164	207	249	291										
125	1	21	54	101	157	208	264	301	322	333	342	350	310	326	2	28	47	62	79	98	123	159	201	243	285										
130	0	18	49	95	150	208	259	298	321	333	342	350	320	315	355	26	48	65	81	98	120	151	191	232	274										
140	0	14	42	85	139	196	249	292	319	334	343	350	335	300	343	21	48	67	85	98	117	142	176	215	258										
156	1	12	33	70	121	177	232	278	312	332	348	352	340	294	338	18	47	68	84	99	115	138	171	210	251										
160	359	10	30	65	115	171	227	274	309	331	343	351	350	284	329	11	45	69	86	101	115	134	164	200	241										
170	0	10	26	57	104	159	215	264	303	339	342	352	365	267	313	350	40	60	88	103	115	131	153	186	224										
187	359	10	23	46	87	139	195	246	288	321	340	349																							

D

As regards Mercury, notwithstanding the example given below, it will generally be found easier to determine first of all the exact day from the position of the Moon, Sun, Mars, Jupiter, Saturn and Venus, and then test the date for Mercury. If we cannot get a satisfactory position for Mercury in this way, it will be better to leave Mercury alone, as we did with Venus as well as Mercury in the horoscope from *Buddhavidyotini*, than to condemn on this account alone the whole horoscope as forged or fictitious.

'Table O.D.' for the following horoscope from VARAHAMIHIRA's *Brhatjataka*, Ch. XI. Rājāyoga, v. 15: "VENUS in its own house, Vriha; the MOON in 9th house (Tula); other planets, Sun, Mars, Mercury, Jupiter and Saturn in 1st, 3rd and 11th houses." We take SUN, MARS and MERCURY in Mēsha, JUPITER in Dhanus, and SATURN in Kumbha. We shall find that during the 10,902 years from B.C. 5452 to A.D. 5451 the only year that suits exactly is A.D. 845, Sunday 29th March. For previous realizations we must go back to B.C. 17923 and B.C. 16155; and for the next realization we have to wait until A.D. 8162 or A.D. 9820.

Cycles of 237 Years.	1st N.M. in S. Years.	B.C. Years.	MARS.				JUPITER.		SATURN.		MERCURY.			
			5 days.	10 days.	20 days.	31 days.	0 to 31 days.	0 to 31 days.	0 to 31 days.	0 to 31 days.	0 to 20 days.	30 & 31 days	30 & 31 days	30 & 31 days
23	24-1	-5451	168	214	157	203	147	192	134	179	256	285	239	272
22	12-0	-5214	165	211	154	200	144	189	131	176	263	292	223	256
21	29-3	-4977	162	208	151	197	141	186	128	173	271	300	207	240
20	17-2	-4740	159	205	148	194	138	183	125	170	279	308	191	224
19	5-0	-4503	155	201	144	190	134	179	121	166	286	316	175	208
18	22-3	-4266	152	198	141	187	131	176	118	163	294	323	159	192
17	10-2	-4029	149	195	138	184	128	173	115	160	302	331	143	176
16	27-5	-3792	146	192	135	181	125	170	112	157	309	338	127	160
15	15-4	-3555	143	189	132	178	122	167	109	154	317	346	111	144
14	3-2	-3318	140	186	129	175	119	164	106	151	325	354	95	128
13	20-6	-3081	137	183	126	172	116	161	103	148	332	2	79	112
12	8-4	-2844	134	180	123	169	113	158	100	145	340	9	63	96
11	25-7	-2607	131	177	120	166	110	155	97	142	348	17	48	81
10	13-6	-2370	128	174	117	163	107	152	94	139	355	24	32	65
9	1-4	-2133	125	171	114	160	104	149	91	136	3	32	16	49
8	18-8	-1896	122	168	111	157	101	146	88	133	11	40	0	33
7	6-6	-1659	119	165	108	154	98	143	85	130	18	47	344	17
6	24-0	-1422	116	162	105	151	95	140	82	127	26	55	328	1
5	11-8	-1185	113	159	102	148	92	137	79	124	34	63	312	345
4	29-1	-948	110	156	99	145	89	134	76	121	41	70	296	329
3	17-0	-711	107	153	96	142	86	131	73	118	49	78	280	313
2	4-8	-474	104	150	93	139	83	128	70	115	57	86	264	297
1	22-2	-237	101	147	90	136	80	125	67	112	64	93	248	281

A.D. 0	10-0 (-B.C. 1)	A.D.	98	144	87	133	77	122	64	109	72	101	282	265	26	317	226	70
1	27-4	237	95	141	84	130	74	119	61	106	80	109	216	249	8	299	208	52
2	15-2	474	92	138	81	127	71	116	58	103	87	116	200	233	350	281	190	34
3	3-0	711	89	135	78	124	68	113	55	100	95	124	184	217	332	263	172	16j
4	20-4	948	86	132	75	121	65	110	52	97	103	132	168	201	314	245	154	358k
5	8-2	1185	83	129	72	118	62	107	49	94	110	129	152	185	295	226	135	339
6	26-6	1422	80	126	69	115	59	104	46	91	118	147	136	169	277	208	117	321
7	13-4	1659	77	123	66	112	56	101	43	88	126	155	120	153	259	190	99	303
8	1-2	1896	74	120	63	109	53	98	40	85	133	162	104	137	241	172	81	285
9	18-6	2133	71	117	60	106	50	95	37	82	141	170	88	121	223	154	63	267
10	6-4	2370	68	114	57	103	47	92	34	79	149	178	72	105	204	135	44	248m
11	23-8	2607	65	111	54	100	44	89	31	76	156	185	56	89	186	117	26	230n
12	11-0	2844	62	108	51	97	41	86	28	73	164	193	41	74	168	99	8	212
13	28-9	3081	59	105	48	94	38	83	25	70	172	201	25	58	150	81	350	194
14	16-8	3318	56	102	45	91	35	80	22	67	179	208	9	42	132	63	332	176
15	4-6	3555	53	99	42	88	32	77	19	64	187	216	353	26	113	44	313	167
16	22-0	3792	50	96	39	85	29	74	16	61	195	224	337	10	95	26	295	159
17	9-8	4029	47	93	36	82	26	71	13	58	202	231	321	354	77	8	277	121
18	27-1	4266	44	90	33	79	23	68	10	55	210	239	305	338	59	350	259	103o
19	15-0	4503	41	87	30	76	20	65	7	52	218	247	289	322	41	332	241	85
20	2-8	4740	37	83	26	72	16	61	3	48	225	254	273	306	22	315	222	66
21	20-2	4977	34	80	23	69	13	58	0	45	233	262	257	290	4	295	204	48
22	8-0	5214	31	77	20	66	10	55	357	42	241	270	241	274	346	277	186	30
23	25-3	5451	28	74	17	63	7	52	354	39	248	277	225	258	328	259	168	12p

Four lines of figures for VENUS apply to all the above cycles of years as follows:—Cycles to which each line of figures is applicable.

B.C. years	{	309	42	10	130	42	142	112	126	3	7	11	15	19	23
		219	312	280	40	312	52	22	36	2	6	10	14	18	22
		129	222	190	310	222	322	292	306	1	5	9	13	17	21
		20 to 31	10th day.	0 day.	30th & 31st										
		30°	60°	30° 55 20"	30° 45 30"	60°	30°								
B.C. and A.D. years	..	39	132	100	220	132	232	202	216	0	4	8	12	16	20
A.D. years	{	309	42	10	130	42	142	112	126	1	5	9	13	17	21
		219	312	280	40	312	52	22	36	2	6	10	14	18	22
		129	222	190	310	222	322	292	306	3	7	11	15	19	23

[Each of the footnotes (d) to (p) draws attention to a case of partial or complete agreement between P.F. and O.D'. in the year obtained by adding to the year in col. 3 the plus figure in the footnote.]

(d) + 223, Saturn 205.

(e) + 223, Mars 203 (0 day); Merc. 332 (30th day).

(f) + 189; Merc. 270 (30th day); Moon, 210° (23rd day); Mars' G.P. 37° which is unsuitable.

(g) + 228; Mars 80 (31 days); Venus 223 and Merc. 245 (0 to 20 days); Moon 210° (18 days). (h) + 228; Mars 80, right for 31st day (Nak. Chitra); Venus 223; Venus' G.P. on 31st day 60°, not right.

(j) + 134=A.D. 845 Right.

(k) + 134; Merc. 133; Venus 295.

(l) + 40, Venus 8

(m) + 6, Jup. 182.

(n) + 6, Moon 210° (17 days); Venus 271 (0 to 10 days).

(o) + 55, Venus 145.

(p) + 21, Venus 49.

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N.B.—The first figure after each entry refers to the page, and the second, between brackets, to the paragraph

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